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The Regional Municipality of
Hamilton-Wentworth

Solid Waste Management System

Years 1978 to 1987

Contract no. RHW-76-81

**report to
engineering services committee
proposal/tender evaluation**

July 1977



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THE REGIONAL MUNICIPALITY OF
HAMILTON-WENTWORTH

SOLID WASTE MANAGEMENT SYSTEM
Years 1978 to 1987 Inclusive

Contract No. RHW 76-81

REPORT TO
ENGINEERING SERVICES COMMITTEE
ON
PROPOSAL/TENDER EVALUATION

by Solid Waste Management
Steering Committee

C.T.C. Armstrong,
Chairman.



ERRATA

1. In the 'Summary of Proposer/Tenderers' and in Section 4.3.1, page 21, Jet Disposal Limited is referred to as being associated with Environmental Waste Systems Inc.

Environmental Waste Systems Inc. is a joint venture between Regional Waste Systems Inc. and Browning Ferris Industries of Toronto Limited, and is not connected with Jet Disposal Limited.

2. Table 3, page 68, SWR with bulk transfer Dundas-Glanbrook, Total Capital Cost including rolling stock landfill equipment should read \$13,500,000.
3. Table 'A', Executive Summary, is revised to read as follows (see attached)
4. Chart 'A', Executive Summary is revised as follows: (see attached).

Errata 3 and 4 added August 29th, 1977.

(III)

TABLE 'A'

<u>Acceptable Systems</u>	<u>Total Estimated Annual Cost* To the Region</u>
Tricil Limited Full Service Contract Bulk Transfer, Conventional Sanitary Landfill	\$ 7,923,323.
Laidlaw Transportation Limited Direct Transfer System, Conventional Sanitary Landfill	\$ 8,192,051.
A. Cope and Sons Limited Bulk Transfer System, Conventional Sanitary Landfill	\$ 8,902,990.
Solid Waste Reclamation Inc. Bale Transfer System, Balefill	\$ 9,960,150.
Laidlaw Transportation Limited Bale Transfer System, Balefill	\$10,269,259.
Environmental Waste Systems Inc. Bulk Transfer System, Conventional Sanitary Landfill	\$10,911,543.
A. Cope and Sons Limited, Bale Transfer System, Balefill	\$11,366,636.

* See Table 7, Page 104, for items that are excluded from
Total Annual Cost.

(IV)

CHART 'A' - LEGEND

Tricil - Tricil Limited, jointly owned by Canadian Industries Limited and Trimac Limited

Laidlaw - Laidlaw Transportation Limited

EWS - Environmental Waste Systems Inc. - Consortium of Jet Disposal Limited and Browning Ferris Industries Inc.

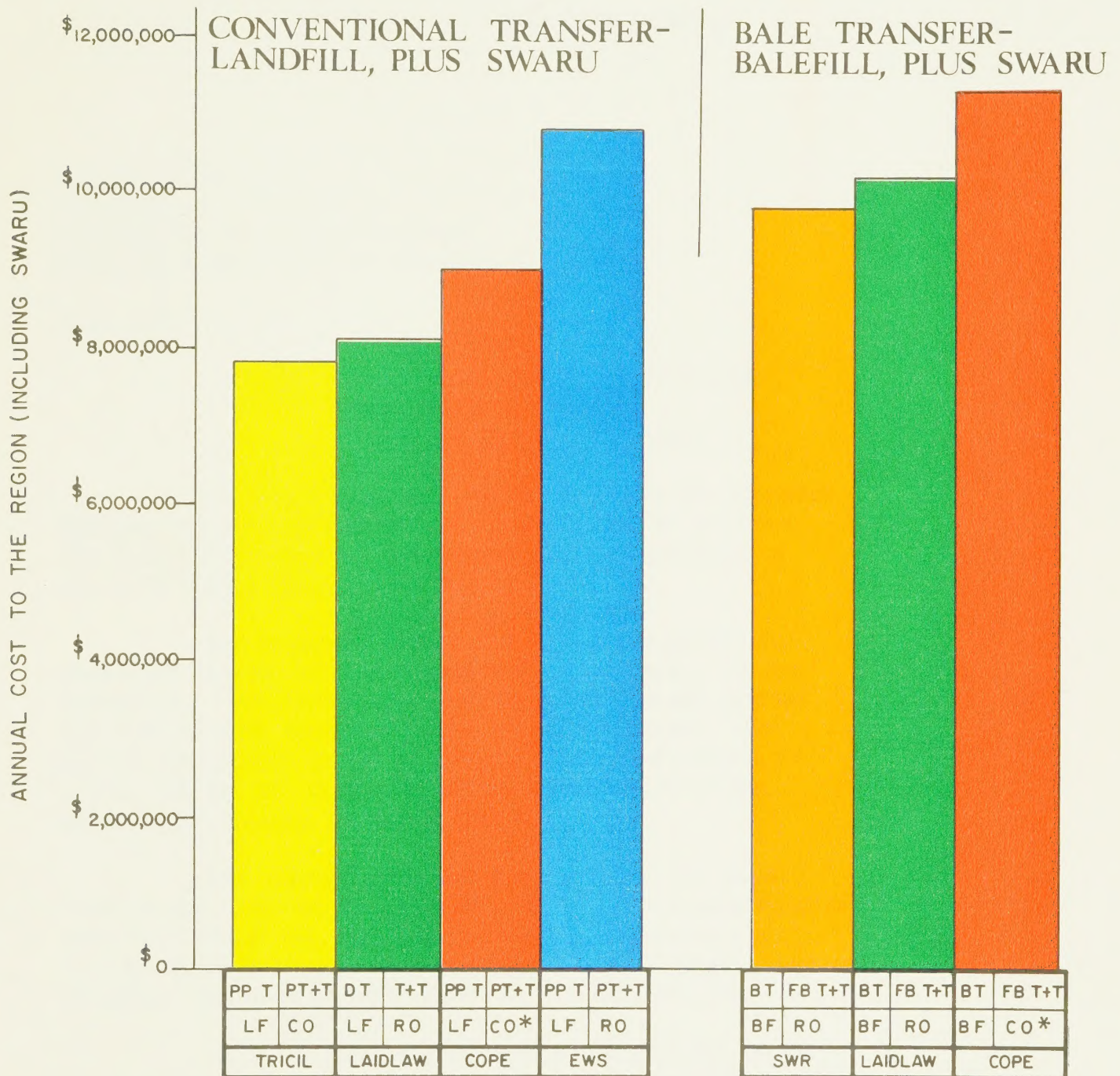
SWR - Solid Waste Reclamation Inc. - 95% owned by I. Waxman and Sons Limited

Cope - A. Cope and Sons Limited

System Element	Chart 'A' Code Abbr.	Description of System Element Proposed
Transfer Station	PP T	Push-Pit Transfer
	D T	Direct Transfer
	B T	Baler Transfer
Haul Vehicles	P T+T	"Packer" Trailer + Tractor
	T+T	Trailer + Tractor
	FB T+T	Covered Flatbed Trailer + Tractor
Landfill	LF	Conventional Landfill
	BF	Balefill
SWARU	C O	Contractor Operated Guaranteed Thruput
	R O	Region Operated

CHART A

TOTAL ANNUAL COST TO THE REGION FOR 'ACCEPTABLE' SYSTEMS



* MANAGED BY CONTRACTOR

SEQUENCE OF ABBREVIATIONS, REFER TO LEGEND ON OPPOSITE PAGE			
TRANSFER STATION TYPE		HAUL VEHICLE TYPE	
TYPE OF LANDFILL OPERATION		OPERATOR OF SWARU	



THE REGIONAL MUNICIPALITY OF HAMILTON-WENTWORTH

OFFICE OF THE CO-ORDINATOR
CENTURY 21, 100 MAIN ST. E., HAMILTON, 526-4263

Mailing Address: P.O. BOX 910, HAMILTON, ONTARIO L8N 3V9

July 25th, 1977.

Mr. R. Wheeler
Chairman, and Members
Engineering Services Committee
Regional Municipality of Hamilton-Wentworth

Dear Sir:

Re: Solid Waste Management System
Years 1978 to 1987
Report on Tender Evaluation

As you are aware, the Solid Waste Management Systems Steering Committee was established to evaluate the tenders received by the Region for the operation of its solid waste management system.

The attached report and the recommendations contained therein has been approved unanimously by our committee. We recommend that Regional Council accept the Full Service Contract tender of Tricil Limited, the lowest acceptable tender received. The Tricil tender is a firm bid for the operation of the entire solid waste management system including SWARU.

The tenders received are open for 185 days. This period ends on August 29th, 1977. Since negotiations must be carried out with the successful contractor, and an agreement drafted, we recommend that we receive further direction within the period that the tenders are open.

As well as reviewing and analysing the tender documents and interviewing the proponents, we have visited ten comparable facilities and have discussed the alternatives with the Ministry of the Environment. We are confident that the recommended system is feasible,


... Continued

Mr. R. Wheeler

Page 2

economic and will be approved by the Ministry of the
Environment and Environmental Assessment Board.

Yours very truly,



C. T. C. Armstrong
Chairman

CTCA:tp

EXECUTIVE SUMMARY

In November 1976 the Region called tenders for operation of its solid waste management system for the years 1978 to 1987 inclusive. Tenders were received from the following contractors:

- A. Cope and Sons Limited
- Environmental Waste Systems Incorporated
- Laidlaw Transportation Limited
- M & T Chemicals Limited
- Solid Waste Reclamation Incorporated
- Tricil Limited

Following a report from the Commissioner of Engineering, Regional Council rejected the tender submitted by M & T Chemicals Limited, and established the Solid Waste Management Systems Steering Committee, whose task is to recommend the course of action that the Region should take with respect to the tenders received.

The Steering Committee has carried out a detailed analysis of all the bids, which is described in the report.

'Acceptable' bids are defined as those bids of acceptable systems from acceptable contractors.

The following systems were proposed by various contractors:

- Bulk Transfer
- Direct Transfer
- Bale Transfer
- Direct Haul System
- Front End Plant

The bulk, direct and bale transfer systems are recommended as acceptable systems for reasons stated on pages 119, 120 and 121.



The Direct Haul and Front End systems are, in our opinion, 'Unacceptable' systems for the reasons stated on pages 118 and 123.

The Committee recommends against awarding the contract to A. Cope and Sons Limited as that firm does not have any previous experience in the field of solid waste management, its 'bids' are not fixed, and as can be seen on page 104, Table 7, of the report, the total annual estimated cost to the Region, using their 'bids' is higher than is the case using the recommended system.

The systems shown on Table 'A' are recommended as acceptable for the management of the Region's solid waste. These systems are shown graphically on Chart 'A', on the following pages.

The low bidder for an acceptable system, Tricil was unique of all the bidders in offering a firm price and a guaranteed tonnage of 120,000 tons per year (twice the current performance) for the operation of SWARU. This cost is included in the total annual cost shown above. The total annual costs for the other bidders include the cost of operation of SWARU by the Region.

The Steering Committee recommends that the Tricil Full Service Contract tender be accepted by the Region. This tender includes the following services:

- SWARU operation, management and improvements
- Construction of transfer stations at Kenora Avenue, Upper Ottawa Street and Dundas
- Operation of the transfer system
- Operation of the Glanbrook Landfill site.

The Committee also recommends:

- That the transfer stations be constructed by Tricil and owned by the Region so that the most advantageous financing methods can be used
- That the operation contract be for a five-year period with the Region having the right to renew for a further five years.



TABLE 'A'

<u>Acceptable Systems and Contractors</u>	<u>Total Estimated Annual Cost* To the Region</u>
Tricil Limited Full Service Contract Bulk Transfer, Conventional Sanitary Landfill	\$ 7,923,323.
Laidlaw Transportation Limited Direct Transfer System, Conven- tional Sanitary Landfill	\$ 8,192,051.
Solid Waste Reclamation Inc. Bale Transfer System, Balefill	\$ 9,960,150.
Laidlaw Transportation Limited Bale Transfer System, Balefill	\$10,269,259.
Environmental Waste Systems Inc. Bulk Transfer System, Conventional Sanitary Landfill	\$10,911,543.

* See Table 7, Page 104, for items that are excluded from
Total Annual Cost.



CHART 'A'

CHART 'A' - LEGEND

Tricil - Tricil Limited, jointly owned by Canadian Industries Limited and Trimac Limited

Laidlaw - Laidlaw Transportation Limited

EWS - Environmental Waste Systems Inc. - Consortium of Jet Disposal Limited and Browning Ferris Industries Inc.

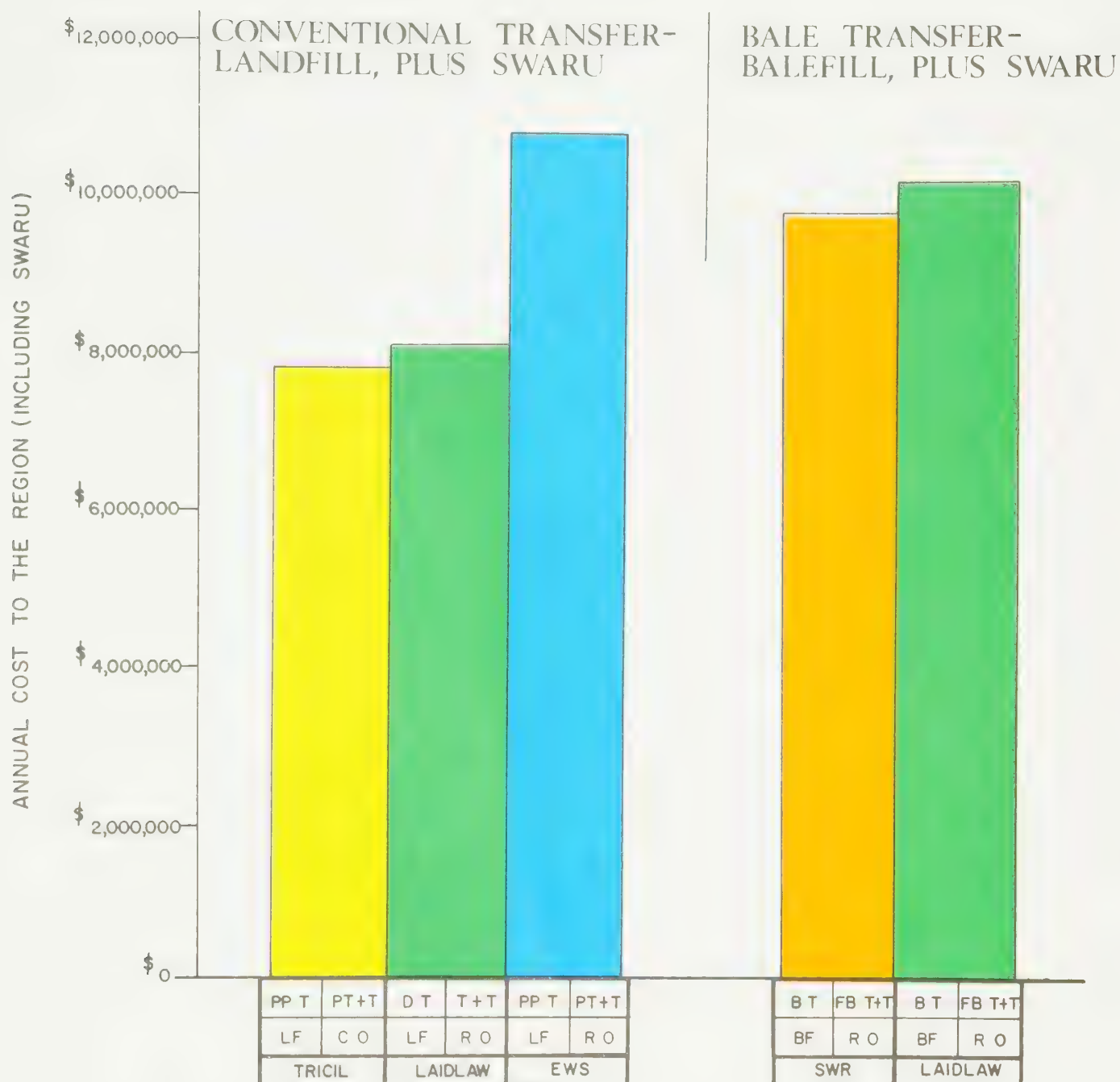
SWR - Solid Waste Reclamation Inc. - 95% owned by I. Waxman and Sons Limited

System Element	Chart 'A' Code Abbr.	Description of System Element Proposed
Transfer Station	PP T	Push-Pit Transfer
	D T	Direct Transfer
	B T	Baler Transfer
Haul Vehicles	P T+T	"Packer" Trailer + Tractor
	T+T	Trailer + Tractor
	FB T+T	Covered Flatbed Trailer + Tractor
Landfill	LF	Conventional Landfill
	BF	Balefill
SWARU	C O	Contractor Operated Guaranteed Thruput
	R O	Region Operated



CHART A

TOTAL ANNUAL COST TO THE REGION FOR 'ACCEPTABLE' SYSTEMS



SEQUENCE OF ABBREVIATIONS, REFER TO LEGEND ON OPPOSITE PAGE			
TRANSFER STATION TYPE		HAUL VEHICLE TYPE	
TYPE OF LANDFILL OPERATION		OPERATOR OF SWARU	



The recommended Tricil system results in a conventional sanitary landfill system at Glanbrook. The Committee recommends this system as an acceptable form of landfill, which will be carried out in conformity with the requirements of the Ministry of the Environment. In the opinion of the Committee the advantages of balefill systems are not sufficient to justify the additional \$2,000,000 annual expenditures required for the lowest cost balefill system.

The recommended five year contract term will allow the Region to add on a resource recovery system or systems to the transfer stations should it be demonstrated by the end of the first five year period that such a system is technically and economically feasible. In our opinion, it will be at least five years before resource recovery technology is proven in large scale systems and markets for the recovered materials developed.

The operation of SWARU by Private Enterprise is, in our opinion, a very attractive proposition for the Region. The Tricil tender provides for a guaranteed tonnage and includes the cost of the improvements to achieve that performance. Operation of the Region's entire solid waste management system by a single contractor means that fluctuations in operation of various system components are his sole responsibility and cannot result in disputes between different contractors and/or the Region.

The recommended system will result in an increase in cost to the Region for solid waste management from the current cost of approximately \$4,150,000 per year to over \$8,000,000 per year. When the system is implemented, consideration should be given to increasing the charges to commercial users levied by the Region. These users generate approximately 80% by weight of the waste in the Region and will experience savings due to reduced hauls for the recommended system.



(VII)

The increased charges should at least reflect these savings, which can be readily identified. The recommended system will also reduce the collection system costs for some of the local municipalities, and it will reduce the amount of wastes to be landfilled due to the increased capacity at SWARU.

All of the bids received by the Region demonstrate that a great deal of effort and expense has been devoted by the proponents in their preparation. The Region is fortunate in being able to choose from such a large number of competitive bids for feasible systems.



SUMMARY OF PROPOSER/TENDERERS

Proposal/Tenders, hereinafter referred to as tenders or bids, were received from five firms. Below is a brief description of each firm and a description of the colour code used for that firm used throughout the report.

A. Cope and Sons Limited: 'Cope' (red)

Cope is a Hamilton-based firm that has, to date carried out business in the fields of general contracting and pipe manufacturing.

Environmental Waste Systems Inc.: 'EWS' (blue)

EWS is a consortium of Jet Disposal Limited, a Hamilton-based firm and Browning Ferris Industries of Toronto Limited, a subsidiary of Browning Ferris Industries Inc., a large company that specializes in solid waste management, and which is United States owned.

Laidlaw Transportation Limited: 'Laidlaw' (green)

Laidlaw is a Hamilton-based company which generally carries out business in the fields of trucking and solid waste management, throughout Canada.

Solid Waste Reclamation Inc.: 'SWR' (orange)

SWR is owned 95% by I. Waxman and Sons Limited, a Hamilton firm that specializes in recovery of useable items from waste materials, and also operates a solid waste collection system.

Tricil Limited: 'Tricil' (yellow)

Tricil is owned jointly by Canadian Industries Limited, a large Canadian company and Trimac Limited, a Canadian trucking company. Tricil specializes in solid and liquid waste management.



ABBREVIATIONS AND SPECIALIZED TERMS

Several abbreviations and specialized terms are used throughout the text. The following list, although not comprehensive covers the most frequently used items.

Acceptable Wastes:

The solid wastes to be handled by the transfer/landfill system and SWARU. They consist of Residential, Non-Residential, Municipal and Industrial Wastes.

Bale Transfer System:

Acceptable wastes are delivered to a building where they are passed through a machine which increases their density and forms them into cube shape (bales). The bales are then loaded into flat-bed trailers, trucked to the sanitary landfill (balefill) site and deposited there.

Bulk Transfer System:

Acceptable wastes are delivered to a building where they are deposited in a push-pit. The push-pit mechanism delivers the wastes into a purpose-made enclosed trailer and compacts the wastes inside the trailer. The trailer is then transported to the sanitary landfill site where the wastes are discharged.

Front End Plant:

A facility where wastes are pre-processed for use in a subsequent process. A front end plant may consist of one or more of the following processes: shredding, metallic separation, air classification (separation).



Direct Transfer System:

Acceptable wastes are delivered to a building where they are deposited through a hole in the floor into an open topped trailer at a lower level. When the trailer is full, it is covered and transported to the sanitary landfill site, where the wastes are discharged.

Non-Acceptable Wastes:

Construction debris, earth fill, broken concrete, asphalt, tree stumps and other near-inert materials.

Proposal/Tender, Tender, Bid:

The documents submitted by the five firms proposing to establish a solid waste management system for the Regional Municipality of Hamilton-Wentworth.

RDF:

Refuse Derived Fuel, produced by processing acceptable wastes through a front end plant.

SWARU:

Hamilton-Wentworth Solid Waste Reduction Unit.



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* Bound in a separate volume



SECTION 1

INTRODUCTION



1. INTRODUCTION

The purpose of this report is to review in detail the tenders received for the Region's Solid Waste Management System, and to recommend the course of action that the Region should take with respect to these tenders.

All of the tenders received demonstrated that the proponents have devoted a great deal of time and expense in submitting bids on feasible systems to the Region. Although, as expected, no miracle solution to the problem has been proposed, the Region is very fortunate in being able to choose between five contractors and nine feasible systems.

Throughout the report various costs are calculated to the nearest dollar. A number of assumptions, defined in the text have been used in these calculations, and the dollar amounts shown should only be quoted, based on an understanding of the underlying assumptions made in the calculations.



SECTION 2

BACKGROUND LEADING TO TENDERING PROCESS AND BID EVALUATION



2. BACKGROUND LEADING TO TENDERING PROCESS AND BID EVALUATION

Recognizing that existing waste disposal facilities in the Hamilton-Wentworth area have a limited life, the City of Hamilton, the County of Wentworth and the (then) Ontario Department of the Environment in 1972 jointly engaged Proctor and Redfern Limited to carry out a study to establish the detailed status of all the solid waste management systems in the City of Hamilton and the County of Wentworth.

When the Regional Municipality of Hamilton-Wentworth was formed, pursuant to Section 131 of the Regional Municipality of Hamilton-Wentworth Act, the responsibility for solid waste disposal facilities was transferred to the Region. The terms of reference for the original study were then expanded to include the recommendation of an overall solid waste management system for the Region for the period 1975 - 1995.

As work proceeded on the study, several interim reports were prepared. These are detailed in Appendix 'A'.

The final report on the recommended solid waste management system for the Region was published in February 1976. That report recommended two bale transfer stations, a loose transfer station and a balefill site in Glanbrook. The recommendation was based on the premise that bale transfer costs would be essentially the same as loose transfer costs, and that balefill is a superior form of sanitary landfill.

Following receipt of the consultant's final report, the Region issued a general request for proposals for a solid waste management system. Although the consultant had indicated that a resource and/or energy recovery system was not practical for the Region at this time, it was felt that the Industry should have an opportunity of proposing systems which would reduce or eliminate the need for a sanitary landfill site. The request for proposals is shown in Appendix 'B'.



On March 9th, 1976, at a meeting held to brief the industry on the request for proposals (a list of attendees is shown in Appendix 'C') strong representations were made to the Region that formal tenders be called for, rather than the request for proposals underway at that time. In response to these representations, the Region's strategy was adjusted and on October 8th, 1976 a general tender call for the Region's entire solid waste management system was issued. The tender documents are shown in Appendix 'D'.

The tender documents are somewhat unusual inasmuch as they do not specify the nature of the system required, only suggested locations of transfer stations and the ultimate disposal site (if required). The Proposer/Tenderers were permitted to write unique addenda with respect to any aspect of the tender documents, and hence it was possible to tender on any system of solid waste management. These items are referred to in clauses T.I. 1(c) and T.I. 1(f) in the Tendering Information of the Tender Documents (Appendix 'D').

A briefing meeting for potential proposer/tenderers was held on November 2nd, 1976. The minutes of this meeting are reproduced in Appendix 'E'.

Tenders closed on February 25th, 1977 and documents were submitted at that time by the following firms:

A. Cope and Sons Limited
Environmental Waste Systems Inc.
Laidlaw Transportation Limited
M and T Chemicals Limited
Solid Waste Reclamation Inc.
Tricil Limited

With the exception of the 'Orange Sheets' in the tender documents (Appendix 'F'), all material submitted by the bidders has been treated as strictly confidential.



With the exception of the documents submitted by M & T Chemicals Limited, all the tenders were accompanied by bid bonds. The bonds submitted by A. Cope and Sons Limited, Environmental Waste Systems Inc., Laidlaw Transportation Limited and Tricil Limited were in accordance with the tender documents. The bond submitted by Solid Waste Reclamation Inc. was in accordance with a unique addendum included in the tender documents.

After some deliberation, Regional Council rejected the tender submitted by M and T Chemicals Limited and instructed Regional Staff and their Consultant to proceed with the evaluation of the balance of the tender documents. Council appointed a Steering Committee, consisting of the following persons, and directed this committee to recommend to the Engineering Services Committee the course of action that should be taken. Certified copies of the Council Resolutions relating to the above are reproduced in Appendix 'G'.

The Solid Waste Management Systems Steering Committee consists of the following five persons:

- Mr. C.T.C. Armstrong (Chairman)
Regional Coordinator
- Mr. W.A. Wheten
Commissioner of Engineering
- Mr. J. McAully
Commissioner of Finance
- Mr. R. Plant
Regional Solicitor
- Mr. R. Tait
Proctor and Redfern Limited



The following persons participated, aiding in the evaluation, preparation of briefs, analysis, and reports on site visits:

Mr. J. Leach
Director of Environmental Services

Mr. D. Lychuk (occasional)
Director of Planning

Mr. W.D. Goodings
Proctor and Redfern Limited

Mr. J. Warren
Proctor and Redfern Limited

At the time of appointing the Steering Committee, Regional Council also determined that, since none of the bids received proposed systems independent of a sanitary landfill site, the site in Glanbrook should be acquired. On March 15th, 1977, authority was given to take the necessary steps to acquire the site. A certified copy of the Regional Council Resolution relating to this item is reproduced in Appendix 'G'.



SECTION 3

THE TENDER EVALUATION PROCEDURE



3. THE TENDER EVALUATION PROCEDURE

At its first meeting, on April 12th, 1977, the Steering Committee decided that it would be appropriate to allow each of the bidders to make a presentation to the Committee, and that a questionnaire, requesting details of each of the systems should be forwarded to each of the bidders. The questionnaire is reproduced in Appendix 'H'.

Completed questionnaires were received from the following firms on April 29th, 1977:

A. Cope and Sons Limited
Laidlaw Transportation Limited
Solid Waste Reclamation Inc.
Tricil Limited

These questionnaires together with the original tender documents are on file with the Regional Clerk. A summary of the replies to the questionnaires is also on file and is available for review by authorized persons. The questionnaire was not completed by Environmental Waste Systems Inc.

All of the firms appeared for the interviews and presentations held on May 5th, 1977.

During the above period, representations were received from the legal counsel of Environmental Waste Systems Inc., stating that certain bids should be considered invalid and, objecting to the Steering Committee negotiating with certain bidders. It was pointed out that such objections were premature since the Committee was not negotiating but was evaluating the bids received.

In the questionnaire to A. Cope and Sons Limited, a clause was inserted requesting the firm to remove the option to withdraw the tender after 45 days.

A withdrawal by Cope, satisfactory to the Regional Solicitor was received by him.

The questionnaire received from Laidlaw Transportation Limited included a statement that it would not be held to its tender commitments for a Baled System so long as the Region negotiates with Solid Waste Reclamation Inc.



This statement was rescinded in a letter to the Regional Solicitor from Laidlaw dated May 4th, 1977. The Regional Solicitor has consequently taken the position that the entire Laidlaw tender is valid and binding.

Laidlaw's solicitor has also objected to certain bids being negotiated by the Steering Committee. The Regional Solicitor has given the same response to Laidlaw as to EWS in this regard.

Laidlaw chose not to answer the questionnaire as it related to the Bale Transfer System.

Legal Comments on Bids Considered

The Regional Solicitor has provided the following concluding legal comments on each of the bids considered as a result of his review of the tender documents during the Tender Evaluation procedure:

1. EWS: No adverse legal comment
2. Laidlaw: No adverse legal comment
3. Tricil: No adverse legal comment
4. SWR: Advise obtaining agreement to bond in form provided as condition of negotiations if authorized
5. Cope: Advise obtaining agreement to bond in form provided and withdrawal of condition to return bid security as a condition of negotiations if authorized
6. Cost estimates are not firm bid offers

At its third meeting on May 13th, 1977, the Committee reviewed the information provided in the questionnaires and decided that it would be informative to visit facilities which, in the opinion of the bidders, are comparable with those proposed for Hamilton-Wentworth. Various members of the Committee visited the following sites:



Location	Operating Authority	Proponent	Type of Facility
Kingston, Ontario	Tricil Limited	Tricil Limited	Bulk Transfer Station Pilot Resource Recovery Plant, Conventional Sanitary Landfill Site
Pittsburgh, Pennsylvania	Browning-Ferris Industries	Environmental Waste Systems Inc.	Bulk Transfer Station
Houston, Texas	Browning-Ferris Industries	Environmental Waste Systems Inc.	Shredding/Metal Recovery/ Bulk Transfer Plant, with pilot air classification system, conventional sanitary landfill site
Seattle, Washington	City of Seattle	Laidlaw Transportation Limited	Direct Transfer Stations with user sorting, loose sanitary landfill sites
Cobb County, Georgia	Cobb County	A. Cope and Sons Ltd.	Bale - Transfer Station, Balefill Site
Omaha, Nebraska	City of Omaha	Solid Waste Reclamation Incorporated	Bale Transfer Station Railhaul system Balefill Site, bulk transfer station
Eugene, Oregon	Lane County Oregon	(System similar to Laidlaw Transportation Limited)	Direct Transfer Station, Conventional Sanitary Landfill Site
San Francisco California	City of Mountainview	--	Direct Transfer Station Conventional Sanitary Landfill Site
Toronto, Ontario	Ministry of the Environment	--	Experimental Resource Recovery System, Bulk Transfer Station
Toronto, Ontario	Metropolitan Toronto	--	Bulk Transfer Station, Conventional Sanitary Landfill Sites

During the evaluation period, the Consultant provided the Committee with analytical information relating to the details of the tenders and the questionnaires. As a result of various members of the Committee being questioned as to the status of the bids, it was decided that questions of a legal matter be referred to Mr. R. Plant, and questions of a general nature to Mr. C.T.C. Armstrong, the Committee Chairman.



SECTION 4

DESCRIPTION OF
PROCESSES PROPOSED IN TENDERS



4. DESCRIPTION OF PROCESSES PROPOSED IN TENDERS

4.1 General

Some of the bidders propose only one system, and others propose as many as three alternatives. The proposals range from a direct collection-haul system to a Front End Plant and transfer station system capable of producing Refuse Derived Fuel (RDF). All of the proposals are feasible methods of handling and disposing of the Region's solid waste, and the Region is fortunate to have received so many viable bids. All of the proposed systems require a landfill site for disposal of the Region's wastes. With one exception, all wastes not handled by SWARU would be landfilled. For the exception, all wastes other than ferrous metals would be landfilled in the initial stages.

All of the bidders addressed themselves to the recovery of resources from solid waste, to a greater or lesser extent. In reviewing the bids, however, the committee determined that it will be very difficult to establish a market for such materials until the technology of such systems is proven. Our site visits confirmed this view.

4.2 A. COPE AND SONS LIMITED (Cope)

4.2.1 Introduction

The firm of A. Cope and Sons Limited, a local General Contractor, submitted a very complex proposal, which was the only one of all the proposals to directly address itself to all of the items covered by the original tender documents, namely:



1. Disposal of acceptable wastes
2. Disposal of non-acceptable wastes
3. Disposal of snow
4. Operation of SWARU

Unfortunately, Cope chose to bid on a different tonnage than that specified in the original contract documents. While it is possible that Cope's assessment of the true solid waste load to be handled is accurate, this approach has made it very difficult to compare the Cope bid with the other four under consideration.

The two systems proposed by Cope are shown graphically in Figures 1 and 2.

4.2.2 Details of Proposed System Components and Alternatives

a). Baled Transfer System (Figure 1)

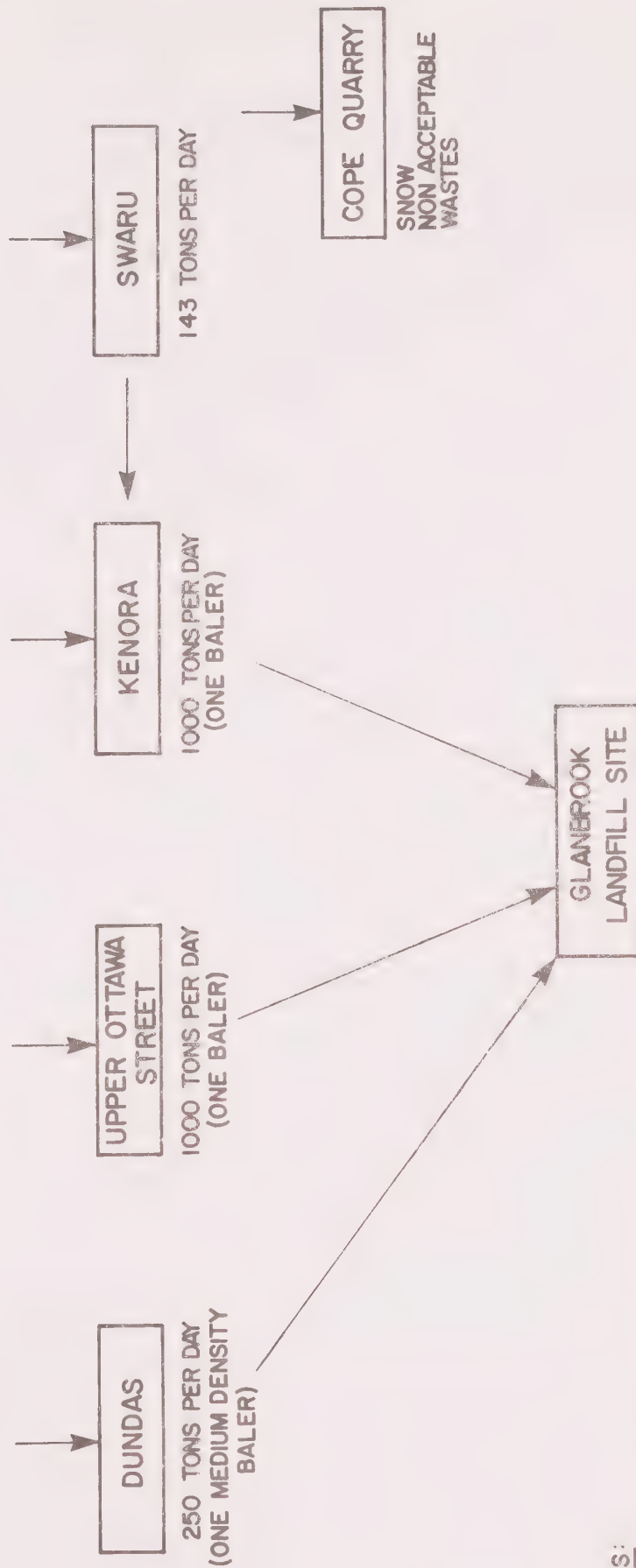
Cope proposes to install two 1,000 tons per day high density American Hoist baler systems, one at the Kenora Avenue site, and the other at the Upper Ottawa Street site. In addition, a medium density American Hoist baler would be installed at the Dundas site. All of these facilities together with appurtenant equipment would be housed in pre-engineered steel buildings with high concrete base walls. All wastes would be transferred directly to the landfill site, which would be operated by Cope.

The company proposes to accept wastes into the system for five days a week, 8 hours a day. The Ottawa and Kenora baling stations, however, would both be operated 16 hours per day, and apparently transfer operations from these two facilities would also occur for 16 hours per day.





A. COPE & SONS LIMITED: BALED TRANSFER SYSTEM



NOTES:

1. 10 HOURS PER DAY.
2. 16 HOURS PER DAY.
3. INCENTIVE CONTRACT TO INCREASE 'SWARU' THRUPTUT.
WASTES TO BE ACCEPTED 8 HOURS PER DAY,
FIVE DAYS PER WEEK.

FIGURE 1

Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

Cope proposes to install a second baler at Kenora Avenue at such time as the solid waste load reaches a level that this is justified.

The system, as proposed would be built by Cope, and the fixed facilities would be financed by the Region. The capital costs of the fixed facilities are estimated, but there is a firm bid price for operation of the system

b). Bulk Transfer System (Figure 2)

For this system Cope proposes to employ three transfer stations, one at Kenora Avenue with two 11 cubic yard push-pits, one at Upper Ottawa Street with two 11 cubic yard push-pits and one at Dundas with a single 11 cubic yard push-pit. The station transfer equipment would be manufactured by Peabody. The transfer station buildings would be of pre-engineered steel construction, similar to those proposed for the bale transfer system. All wastes would be transferred directly to the landfill site, which would be operated by Cope. As with the baled system, Cope proposes to operate the system 8 hours per day, five days per week.

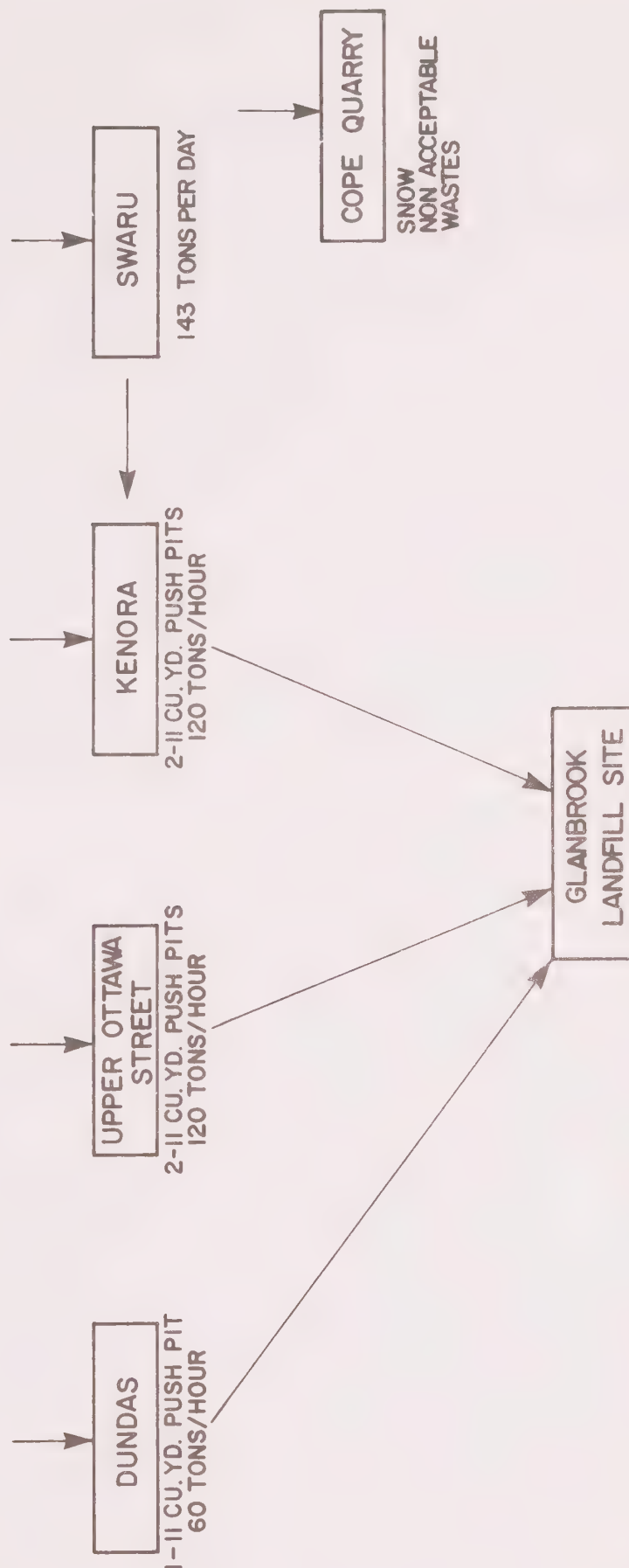
The financial proposals are the same as for the baled system (financing of fixed facilities by the Region with only estimates of cost for fixed items provided by Cope at this time).

c). Landfill Operation

The landfill operation proposed by Cope is common to both proposals, although the techniques and equipment vary depending on the type of material to be landfilled.



A. COPE & SONS LIMITED: BULK TRANSFER SYSTEM



NOTES:

1. INCENTIVE CONTRACT TO INCREASE SWARU THRUPUT. WASTES TO BE ACCEPTED 8 HOURS PER DAY, FIVE DAYS PER WEEK.

FIGURE 2

The costs allowed for by Cope in their bid include construction of an access road, berming, construction of the site building and operation of the site including excavating and restoration. Their bid excludes the cost of constructing and operating a leachate control system as the nature of such a system is unknown at this time.

The capital costs in the tender are estimates and are subject to escalation.

d). SWARU Operation

Cope proposes to operate SWARU on a cost-plus basis. The management fee would vary from nil to \$350,000 per year depending on the processing cost (the lower the processing cost, the higher the management fee). Other than the cost of management there would be no other direct liability to Cope.

e). Rehabilitation of Existing Landfill Sites

Cope proposes to carry out this work on a cost-plus basis. Cope also proposes to develop the end-use of the Glanbrook Site on a financial basis to be negotiated with the Region.

f). Disposal of Non-Acceptable Wastes

Cope proposes to dispose of these wastes at their Cope Quarry in East Hamilton. The proposal recognizes the problem due to the Province of Ontario's definition of 'inert' wastes, which at this time do not include construction debris. However, the intent of the proposal is to accept as much as possible of these wastes at a charge to be negotiated with the Region.



As previously noted, Cope is the only firm to have proposed on all the items covered in the original tender documents. However, other than for the segment of the contract relating to Acceptable Wastes all that is proposed is on a 'cost-plus' or 'to be negotiated' basis.

4.2.4 Financial Aspects

The Cope bids for acceptable wastes are based on the following tonnages and costs:

Tonnage	Adjusted Cost for Year 1, 1977 Dollars	
	Baled Transfer System	Bulk Transfer System
0 - 425,196		\$3,700,000 (min. \$8.70/ton)
560,000		\$4,727,000 (\$8.44 per ton)
Over 560,000		To be negotiated
0 - 427,163	\$5,350,000 (min. \$12.52/ton)	
502,000	\$6,033,000 (\$12.01 per ton)	
Over 502,000	To be negotiated	

The above costs exclude construction of site facilities and construction and operation of the leachate collection system at the Glanbrook landfill site and are based on 10% financing over 10 years for the fixed components of the system. They are also based on estimates for all the capital costs. These estimates



should be distinguished from 'bid price subject to escalation' quoted by other bidders. We have no method of estimating the relationship between the estimated and final capital costs as we are not privy to the estimating methods used by Cope. We would not, however, suggest that the estimates are deliberately low, on the contrary, we have every indication that the Cope bid was very well researched and that the estimates are within the limits normally expected to be accomplished at this time by engineers (\pm 15% plus inflation).

Other financial items that should be noted are that Cope has not included the payment of Realty or Business taxes in his bid. He has not included the cost of appearing at Environmental Hearings, etc. and that he has allowed for a five day per week, eight hours per day acceptance period.



4.3 Environmental Waste Systems Inc. (EWS)

4.3.1 Introduction

The firm of Environmental Waste Systems Inc. is a consortium of Jet Disposal Limited, a local Hamilton firm, and Browning Ferris Industries of Toronto Limited, a subsidiary of Browning Ferris Industries Inc., a large firm specializing in waste management with stated assets of \$300,000,000 and revenues of \$278,000,000 per year. The head office of B.F.I. is in Houston, Texas. During our visit to sites operated by the firm we were advised that Environmental Waste Systems Inc. may be equated with Browning Ferris Industries of Toronto Limited.

The EWS bid closely conforms to the format originally envisaged in the tender documents. There is a large number of very carefully worded unique addenda which have a significant impact on the meaning of the Contract.

The contract documents, when interpreted literally provide for the following services:

1. Disposal of acceptable wastes
2. Disposal of non-acceptable wastes at Glanbrook, apparently for the same tonnage charge as for acceptable wastes, although it was stated in the interviews that the charge would be different.
3. Disposal of snow, although no price is given
4. Operation of SWARU, although there is no guaranteed tonnage.



We have been unable to ascertain many of the details of the EWS proposal as the firm declined to complete the questionnaire.

However, during the interviews when asked by the Committee if the EWS bid included operation of SWARU, the indication received from representatives of the firm was that it did not. The unique addendum by EWS to Part 4 of the Project Specifications of the tender documents states that SWARU will be operated "as specified in the Contractor's Form of Tender". We understand this to mean that the SWARU tonnage thruput is not guaranteed.

Clearly the provision of no guaranteed tonnage allows for SWARU not to be operated by the firm. However, the tender does not specifically state this. This example is typical of many of the clauses in the EWS tender, and it is necessary to interpret the document very carefully to understand the true meaning of the work proposed.

4.3.2 Details of Proposed System Components

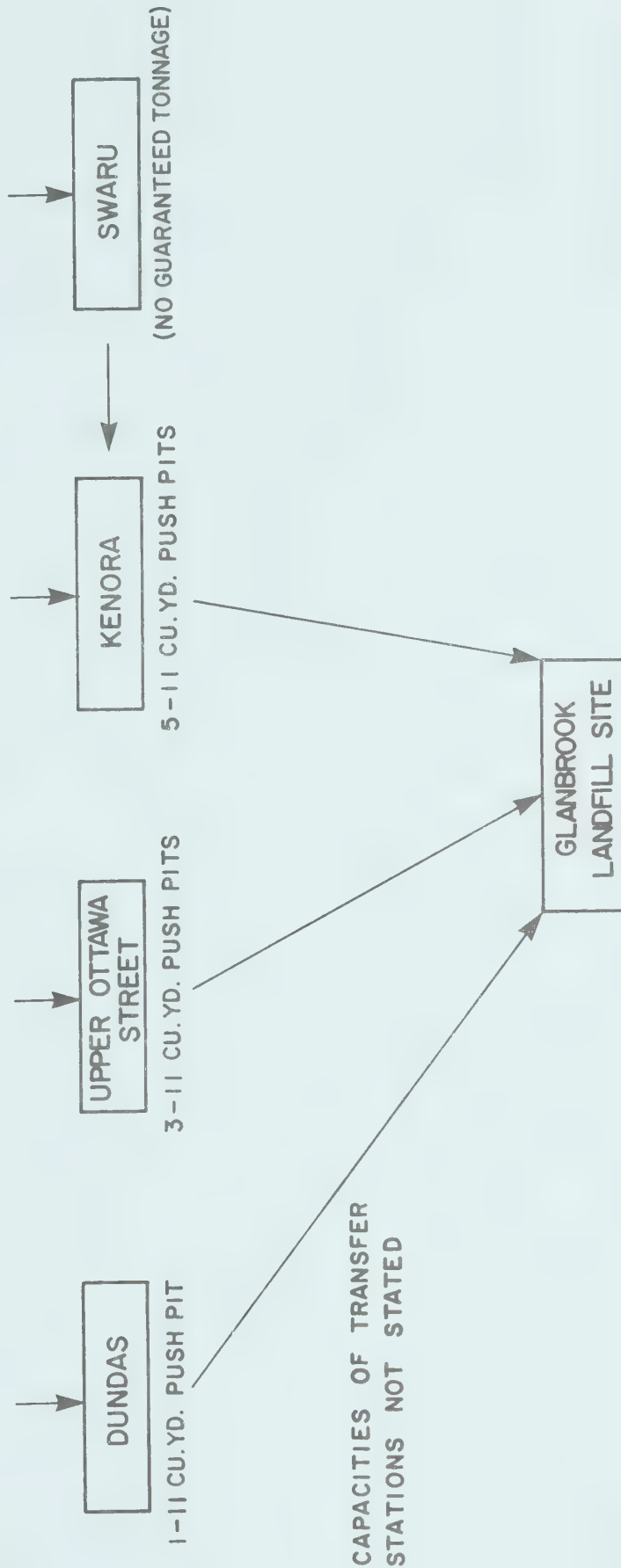
As mentioned above, we have very little information on the details of the system proposed by EWS. Figure 3 was presented to the firm at the interview with a request for advice as to any errors or omissions. We have not received any comment on this depiction of the proposed EWS system.

The tender documents indicate one 11-cubic yard push-pit facility at Dundas, three 11-cubic yard push-pits at Upper Ottawa Street and five 11-cubic yard push-pits at Kenora Avenue. Together with an adequate transfer fleet, these transfer facilities would be more than adequate to handle the stated Acceptable Wastes load of 600,000 tons per year. The proportion of capacities is also similar to that envisaged in the 1976 Proctor and Redfern report. The tender includes





ENVIRONMENTAL WASTE SYSTEMS INCORPORATED: BULK TRANSFER SYSTEM



CAPACITIES OF TRANSFER
STATIONS NOT STATED

operation of the Glanbrook landfill site but excludes the cost of construction and operation of a leachate collection system. Construction of site facilities at Glanbrook is indicated in the tender documents.

4.3.3 Review of Proposal and General Comments

The EWS tender is a true service contract. For a fee the firm will accept the Region's wastes and dispose of them within the limits of the current laws. The firm, however, apparently wishes to maintain a large degree of flexibility in the methods in which it carries out this work. This in itself is not a negative factor.

One of the unique addenda included in the EWS tender reduces the number of working hours in the contract to 2,910 per year, with 7 a.m. opening and 5 p.m. closing. In our opinion, 6 p.m. closing is essential to enable the discharge of 'last loads'. The reduction in hours also has an impact on the value of service provided.

There are many other detailed aspects to the nature of the service proposed, which can be ascertained through a review of the EWS unique addenda.

4.3.4 Financial Aspects

The EWS bid may be summarized as follows:

\$3,840,000 per year + \$6.40 per ton
(\$7,680,000 per year or \$12.80 per ton if
600,000 tons per year).



In removing an estimated allowance for the capital improvements at Glanbrook we estimate the adjusted bid to be \$7,463,000 per year (\$12.43 per ton).

The fixed charge per year of \$3,840,000 is payable irrespective of the tonnage processed and appears to be an allowance for the capital invested in the system. This amount, according to the contract documents, is payable even if the system is inoperative during a work stoppage for any reason whatsoever.

In a letter to the Consultant dated June 8th, 1977 in response to certain questions raised during their tour of BFI facilities, Mr. B. Ranck, of Browning Ferris Industries Inc. advised:

Projected capital investment in facilities
\$5,000,000

Interest Rate allowed for in proposal
11 percent

It is not clear as to whether or not facilities includes or excludes mobile equipment.

The cost of amortizing \$5,000,000 over a ten-year period is approximately \$850,000 per year at 11 percent, considerably less than the capital allowance of \$3,840,000 per year.

In summary, compared with the other comparable bids, the EWS bid is significantly high. The apparent operating charge to the Region for the transfer system appears to be approximately double that of the low bidder Tricil (\$6,800,000/year for EWS and \$3,000,000/year for Tricil). The stated capital cost of the EWS system is comparable with the capital costs of the other bulk transfer systems. We can find no obvious reason for the high EWS operating charge.



4.4 Laidlaw Transportation Limited (Laidlaw)

4.4.1 Introduction

Laidlaw Transportation Limited, a national trucking and waste management firm with stated assets of \$48,000,000, revenues of \$60,000,000 per year, and headquarters in Hamilton, submitted a bid which offered the following services:

1. Disposal of acceptable wastes
2. Disposal of non-acceptable wastes
3. Disposal of snow.

Reference is also made to a 'SWARU option' in a drawing included in the material submitted with the tender documents, and the clauses relating to SWARU in the documents were not adjusted or deleted by unique addenda.

During the interviews, in answer to questions relating to the inclusion of SWARU and agreement with the clauses in the original tender documents, the indication from Laidlaw was that they are prepared to operate SWARU on a negotiated basis and that they are in agreement with all the clauses in the original tender documents.

Our general interpretation is that there are several unclear areas in the Laidlaw bid which would have to be resolved should the Region proceed to negotiate with Laidlaw.



4.4.2 Details of Proposed System Components

a). Direct Haul System (Figure 4)

In this system Laidlaw proposes to collect all municipal (curbside) wastes and direct-haul in small packer vehicles to Glanbrook. Commercial wastes would be direct-hauled to Glanbrook by private Contractors. This system would result in a very large number of vehicle trips per day to and from Glanbrook, and would be very energy intensive.

Nevertheless, this system would eliminate municipal collection systems which have a total operating cost of \$2,529,426 per year (Table 1)

In the 1976 Proctor and Redfern Report, it was estimated that approximately 20% of the solid waste stream by weight was curbside municipal wastes. If this system were to be adopted, we estimate that there would be approximately 100,000 return trips per year of industrial vehicles to Glanbrook. We believe that this amount of additional traffic is unacceptable, and therefore we recommend against serious consideration of this system.

b). Loose Transfer System (Figure 5)

In this system, Laidlaw proposes three loose transfer stations. Wastes would be hauled directly from these facilities to the Glanbrook site for landfill. The transfer stations proposed would be simple pre-engineered steel buildings with tipping floors with holes under which the transfer trailers can be driven. Wastes would be pushed into the transfer trailers, which would then be driven to the landfill site where they would self-unload the wastes. This is a very attractive system from the point of view of not being machinery intensive.





LIDLAW TRANSPORTATION LIMITED: DIRECT HAUL SYSTEM

DIRECT HAUL TO GLANBROOK BY COMMERCIAL, INDUSTRIAL
AND PRIVATE VEHICLES AND BY MUNICIPAL PACKER
VEHICLES OWNED AND OPERATED BY LIDLAW

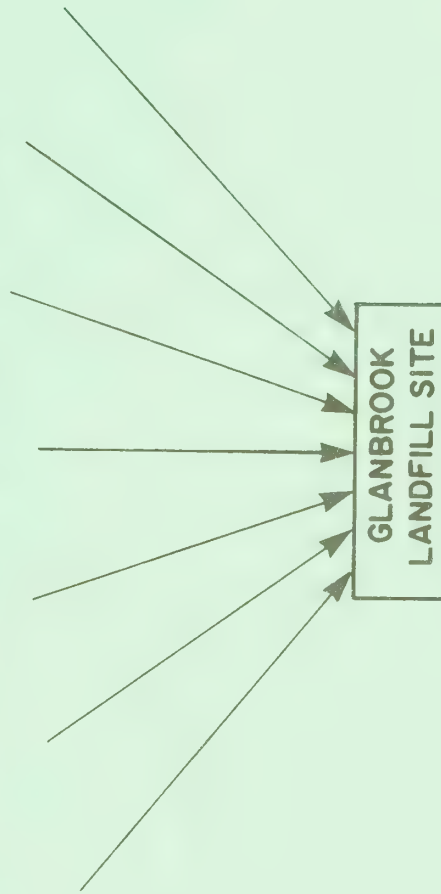


FIGURE 4

 Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM



LIDLAW TRANSPORTATION LIMITED: DIRECT TRANSFER SYSTEM

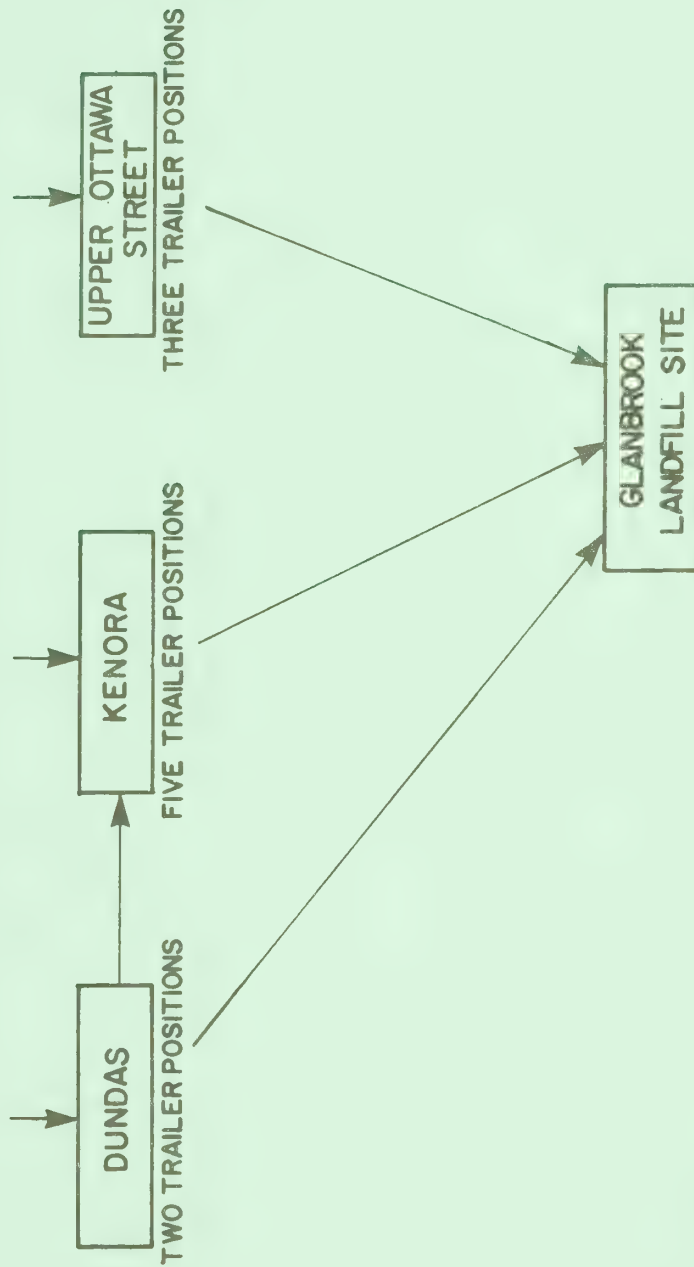


FIGURE 5



Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

TABLE 1

ESTIMATED OPERATION COST
MUNICIPAL COLLECTION SYSTEMS (1977)

Ancaster	\$ 56,000
Dundas	\$113,200
Flamborough	\$122,000
Glanbrook	\$ 70,676
Hamilton	\$1,974,550
Stoney Creek	<u>\$193,000</u>
Total	<u>\$2,529,426</u>

Source: Individual Area Municipalities Budgets
for 1977



The Kenora Avenue transfer station, as proposed, is integral with (an addition to) the existing SWARU building.

c). Bale Transfer System (Figure 6)

Laidlaw proposes to utilize Harris baler machines each capable of processing 50 tons of wastes per hour. Two of these machines would be installed at the Kenora Avenue transfer station, and one at Upper Ottawa Street. Loose wastes would be hauled from a Dundas transfer facility for baling at Upper Ottawa Street. Wastes would then be hauled in Bale transfer vehicles from Upper Ottawa Street and Kenora Avenue to the Glanbrook site.

As with the loose transfer system, Laidlaw proposes that the Bale Transfer Station at Kenora Avenue be an integral addition to the existing SWARU building.

The bale transfer system appears to envisage no on-site storage of bales (i.e. trucking to Glanbrook would take place over a 16-hour basis) since only eleven flatbed trailers have been provided.

Other than for the relatively low tractor/trailer allowance, the facilities proposed are comparable in size and cost with those envisaged in the 1976 Proctor and Redfern Report. We have less information on the Laidlaw Bale Transfer system than on their other systems as they chose not to complete the questionnaire on this aspect of their tender.





LIDLAW TRANSPORTATION LIMITED: BALED TRANSFER SYSTEM

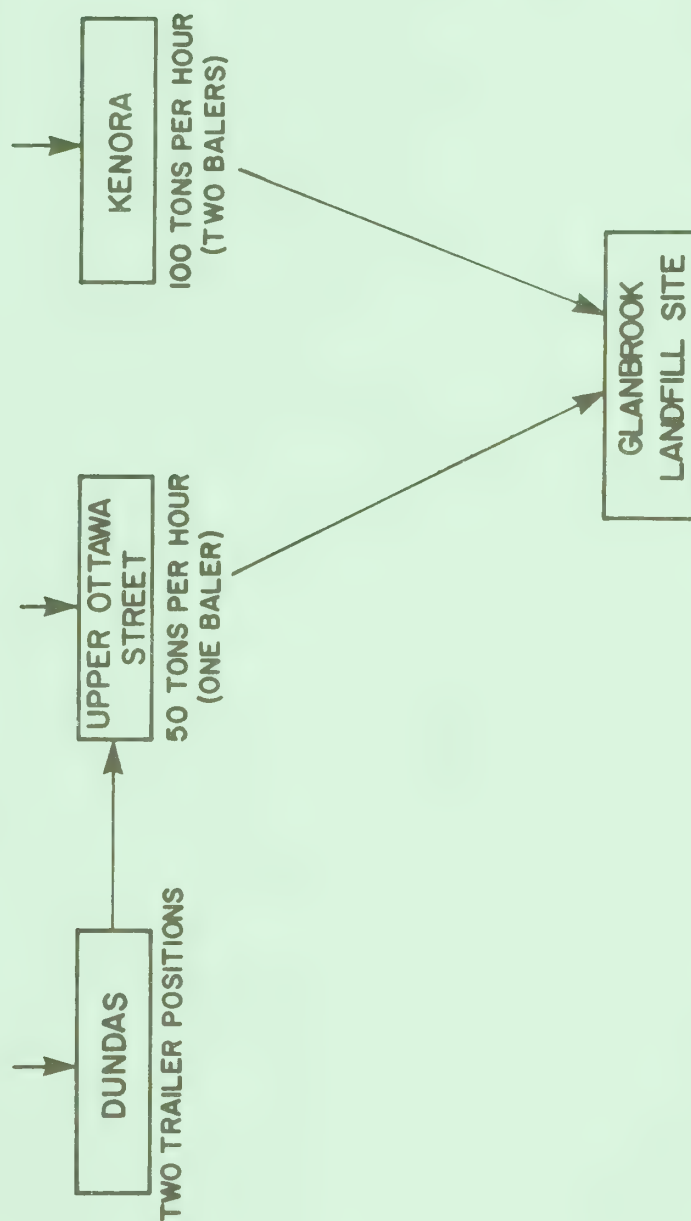


FIGURE 6



Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

d). Operation of Glanbrook Landfill Site

The Laidlaw bid includes operation of the Glanbrook landfill site, the access road, and site buildings. No allowance was made for construction and operation of a leachate control system, refencing or landscaping. The bid in the tender for the specified work is firm.

e). Disposal of Non-Acceptable Wastes

Laidlaw indicates that it has tentative agreement with the owner of a quarry at an unspecified location for operation of a non-acceptable waste disposal site. It is proposed that this site be operated on a 'cost-plus 18%' basis.

f). Disposal of Snow

Laidlaw proposes to carry out this work on a basis to be negotiated.

4.4.3 Review of Proposals and General Comments

The Laidlaw tender provides the Region with two unique systems, the direct haul system, and the loose transfer system. Although the direct haul system is attractive insomuch as the cost to the Region and local municipalities is the lowest of all systems, the total cost of the system is relatively high when the cost incurred by commercial/industrial users is included. The traffic generation problem, and inconvenience of direct haul to Glanbrook, together with the problems of allowing numerous vehicles into the landfill site, are also factors that weigh against the direct haul system.



The direct transfer system, however, is a very attractive possibility for the Region. A relatively low capital investment in buildings is required, and the system is almost fool-proof. There is no transfer/compaction equipment to be serviced and the transfer trailers are capable of carrying loads similar to those carried by compacted transfer vehicles.

Members of the Steering Committee visited similar systems in Seattle, Washington, Lane County (Eugene) Oregon, and a comparable system in San Francisco, California.

In both Seattle and Eugene we were impressed by the simplicity of the system and its smoothness of operation. The transfer stations in Seattle are model installations. In one case the facility is adjacent to a residential area and a bakery and appears to be quite compatible with these uses.

The only cold climate application of this system is in Stillwater Minnesota. We have interviewed Mr. C. Johnson of Bellaire Sanitation who uses two trailers of the same design as those used in Seattle and the same as those proposed by Laidlaw for Hamilton-Wentworth. Mr. Johnson reports that he has no operational difficulties in cold weather, as the garbage is frozen prior to it being deposited in the trailers. We are of the opinion that the potential problems associated with frozen garbage are of concern but that these problems are likely solveable in simple ways.

This aspect of the system, in our opinion is not of sufficient significance for the proposal to be rejected or downgraded.



Although Laidlaw has made a competitive and viable bid for a bale transfer system, we sense that this is the weakest area of their proposal. The firm chose not to provide the Region with details of the system in the questionnaire answers, and representatives did not discuss it during the interview or the site visits.

The snow disposal and non-acceptable waste proposals are on a cost-plus basis, and in our opinion, no evidence has been presented that demonstrates why Laidlaw, rather than any other firm, should carry out this work.

The indefinite references to SWARU in the tender documents, we believe were cleared up in the interviews, and we now understand that Laidlaw has not included the cost of operation of SWARU in their bid.

4.4.4 Financial Aspects

The Laidlaw bid is summarized below. The amounts shown are adjusted figures which exclude all site improvements at Glanbrook.

	Price per Capita per Year	Price per Year for 408,466 persons
Direct Haul System	\$11.63	\$4,750,000
Loose Transfer System	\$11.63	\$4,750,000
Bale Transfer System	\$16.53	\$6,752,000

The bid prices are all reasonable, and for the loose transfer system the price is distinctly attractive. Laidlaw did not adjust the working hours specification in the tender documents, and the total number of hours proposed is 3,100 hours per year.



4.5 SOLID WASTE RECLAMATION INC. (SWR)

4.5.1 Introduction

Solid Waste Reclamation Inc. is owned 95% by I. Waxman and Sons Limited, a Hamilton private company that deals largely in scrap materials, and is one of the largest scrap steel suppliers to the Steel Company of Canada. In a letter included with the contract documents, I. Waxman and Sons Limited is bound by all the obligations of SWR to the Region.

SWR proposes to dispose of acceptable wastes using a bale transfer/balefill disposal system. The firm did not bid on the disposal of non-acceptable wastes, snow disposal or SWARU operation.

4.5.2 Details of Proposed System Components

The SWR system is shown in Figure 7. Two American Hoist 1000 tons per day balers are proposed at Kenora Avenue, one 1000 tons per day American Hoist baler is proposed at Upper Ottawa Street, and two 11-cubic yard Dempster pushpits are proposed at Dundas. These transfer facilities would be housed in pre-engineered steel buildings. All wastes delivered to each of these locations would ultimately be deposited in the Glanbrook site as bales. The tender includes operation of the Glanbrook landfill site and a \$1,000,000 capital allowance for improvements to the site, buildings, etc. The 'adjusted' prices referred to below are based on a reduction of the per year payment to SWR to compensate for this capital allowance.





SOLID WASTE RECLAMATION INCORPORATED : BALED TRANSFER SYSTEM

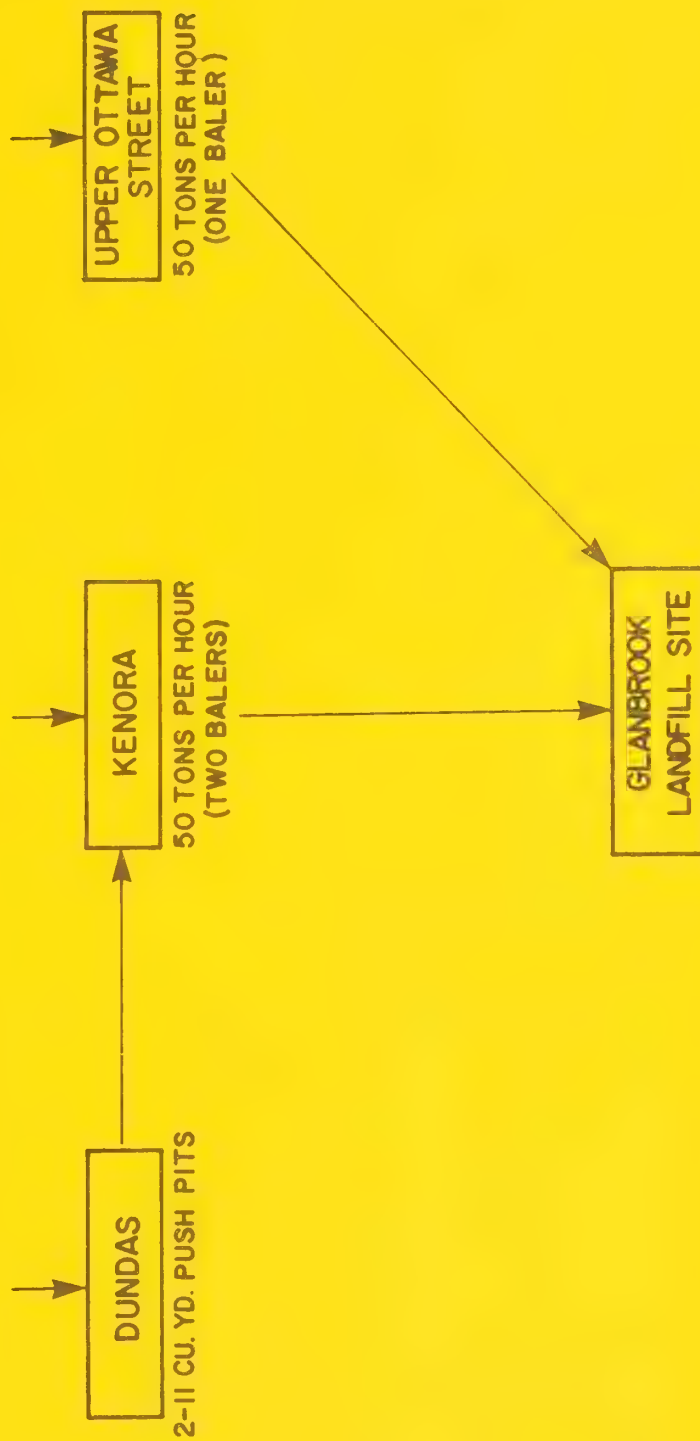


FIGURE 7

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM



Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

In our opinion, the SWR proposal provides an adequate system for handling the Region's solid waste scheme. It is an expensive system, but the balefill concept has certain advantages, as discussed elsewhere in this report.

4.5.3 Review of Proposal and General Comments

The SWR tender documents and questionnaire answers provide an impressive amount of well-researched details of the systems proposed. It is clear that the firm knows the fundamentals of the solid waste business and has taken a sound practical approach to solving the Region's solid waste management problem. One of the particularly impressive aspects of the answers to the questionnaire is that the firm has obtained firm prices for many of the system components as follows:

Balers	Firm to April 1, 1978
Coveyors	Firm to December 31, 1978
Dempster Equipment	Firm to September 30, 1978
Transfer Station Buildings	Firm to 30 days following acceptance of SWR tender by Region.

This means that the capital costs associated with the SWR tender are essentially fixed. Clearly this is a very attractive arrangement for the Region. The system proposed by SWR has a relatively high standby capacity due to the two push-pits provided at Dundas and the potential for direct haul from Dundas to Glanbrook during an emergency. The firm has also provided for a relatively large operating personnel allowance. Although the cost is higher than some other proposals, it is the lowest of all the baling systems proposed. It is clear there is no doubt that there is a strong intent and ability in SWR to provide a very high level of service to the Region. Visits by the Committee to baling systems in Georgia and Nebraska have demonstrated that the concept is perfectly viable for Hamilton-Wentworth.



4.5.4 Financial Aspects

The SWR tender 'adjusted' price of \$6,624,000 per year, excluding the landfill site improvement allowance, is a minimum fee, based on a solid waste stream of 600,000 tons per year. There is no provision for a lower charge if the tonnage is lower, and it is proposed that the fee be negotiated if the tonnage is higher. Although these provisions are relatively severe, they are understandable due to the high (\$13,500,000) capital content of the system.

The SWR bid provides for operating 3,100 hours per year.



4.6 TRICIL LIMITED (Tricil)

4.6.1 Introduction

Tricil Limited is jointly owned by Canadian Industries Limited and Trimac Limited. It was established in 1973 and carries on business generally in the solid waste management and related fields.

Tricil proposes two alternative systems:

1. Management of acceptable wastes, including operation and improvements to SWARU and three push-pit transfer stations at Kenora Avenue, Upper Ottawa Street and Dundas. Operation of the Glanbrook Sanitary Landfill Site.
2. Management of acceptable wastes and processing through a front end plant at Kenora Avenue, operation of and improvements to SWARU and a transfer station at Dundas. Operation of the Glanbrook Sanitary Landfill Site.

The Tricil bid is the only one that provided a firm bid for the operation of SWARU, it is the only one to propose a front end plant, and it includes a very economical firm bid for a bulk transfer system. Tricil does not propose to handle snow or non-acceptable wastes.

4.6.2 Details of Proposed System Components

a). Full Service Contract

The components of the full service contract are shown in Figure 8. Tricil has chosen not to provide specific details of the transfer station equipment proposed. However, we are reasonably confident from reading the tender documents that the following equipment is proposed.

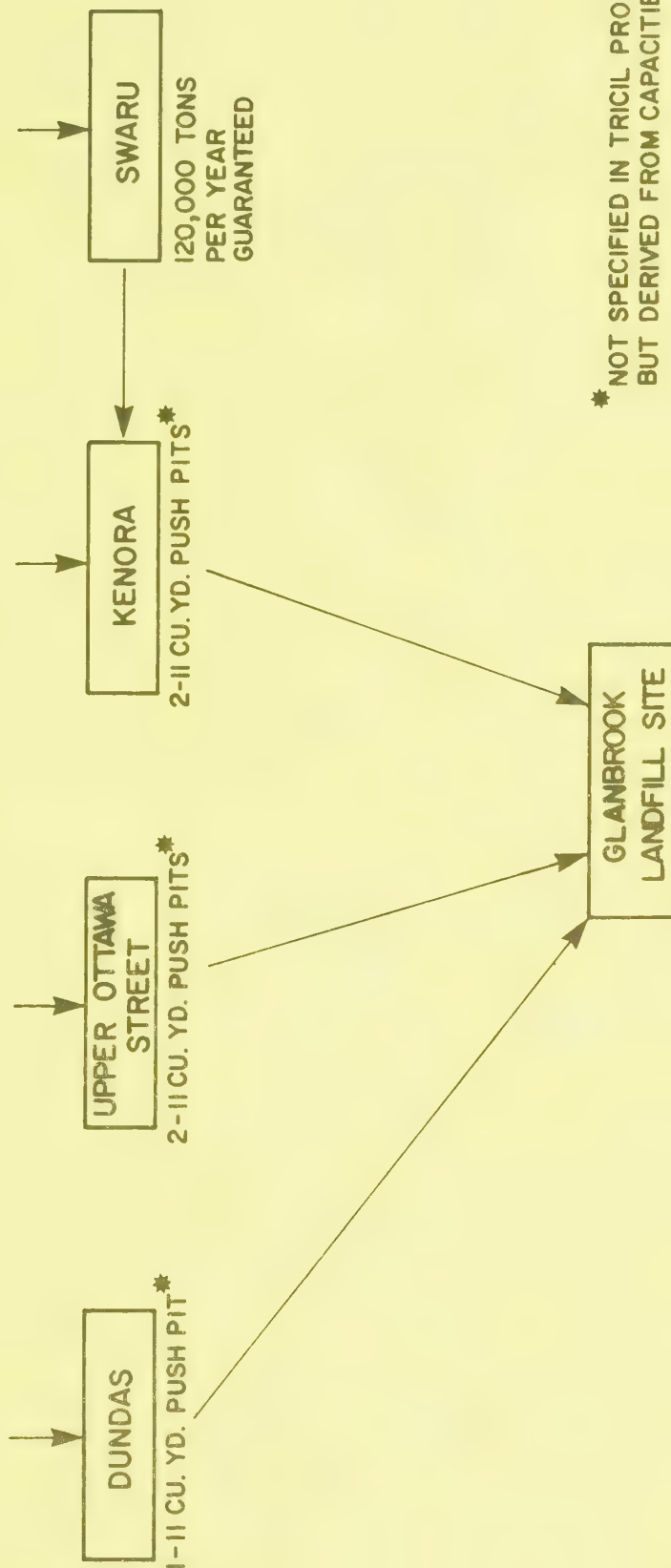
Dundas	One 11-cubic yard push pit
Upper Ottawa Street	Two 11-cubic yard push pits
Kenora Avenue	Two 11-cubic yard push pits





TRICIL LIMITED : BULK TRANSFER SYSTEM


(full service contract)



* NOT SPECIFIED IN TRICIL PROPOSAL,
BUT DERIVED FROM CAPACITIES.

FIGURE 8

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

 Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

Although Tricil states in its tender documents that the transfer equipment is proprietary, during our Kingston visit it was clear that the equipment at the Tricil transfer station there is of Dempster manufacture, although the conveyor/push pit control system is proprietary to Tricil. It is probable that the proposal for Hamilton-Wentworth is a similar system.

The system proposed, therefore, is a relatively conventional bulk transfer system. The equipment provided appears to be the minimum required for the Region's solid waste load, although the company cites a high level of reliability at the Kingston operation. The distribution of capacities is not in accordance with those proposed in the Proctor and Redfern 1976 report (i.e. there is equal capacity at Upper Ottawa Street and Kenora) although, the increased capacity for SWARU proposed would alleviate this situation somewhat.

The Kingston facility, which is cited as the basis of the Tricil concept for Hamilton-Wentworth, delivers wastes to the push pit via a conveyor system, which is also capable of delivering the wastes to an adjacent Resource Recovery System. While this system has certain advantages, a gravity drop into the push pits appears to be less prone to machinery failure. The conveyor system however has the advantage that wastes can be diverted to an adjacent Resource Recovery facility. Also a very small front end loader was being used in the transfer station. While Tricil is clearly a competent firm in the field of solid waste management, they will have the normal difficulties in scaling up from a plant of the Kingston size to a system of the capacity needed by Hamilton-Wentworth. Nevertheless, we are confident in the abilities of the company, and are of the opinion that these factors are not of sufficient importance to reject or downgrade the proposals.



Tricil proposes that the transfer stations consist of buildings constructed of fluted concrete block and metal siding.

As a part of the Full Service Contract, Tricil also proposes to operate SWARU. A penalty clause is included in the tender for processed tonnages less than 120,000 tons per year, and bonuses for tonnages in excess of 150,000 tons per year are provided for. The total accumulated loss to Tricil for operating SWARU, however, is a \$500,000 maximum. At this point the firm reserves the right to terminate this portion of the contract. While the desire to minimize the risk associated with taking over the operation of SWARU is understandable, this amount of maximum liability is not high, and would leave the Region, at least in the early stages of the contract, in an uncertain position with respect to the facility. Tricil has provided no details with respect to any proposed changes that it intends to make to SWARU, although it has stated in the questionnaire that no equipment is to be removed.

b). Resource Recovery Proposal

The Tricil Resource Recovery Proposal is shown in Figure 9. The system provides the Region with the only tendered opportunity to implement a front end processing system which conforms to the Ontario Ministry of the Environment's programme for solid waste handling.

The Kenora Avenue front end plant proposed has the following units:

Two 2000 HP shredders, driven by steam obtained from SWARU

Two three-stage magnetic separators

Diverter system which would lead to future resource recovery processes, and

Four 11-cubic yard push pits.



TRICIL LIMITED : RESOURCE RECOVERY PROPOSAL

(front end system)

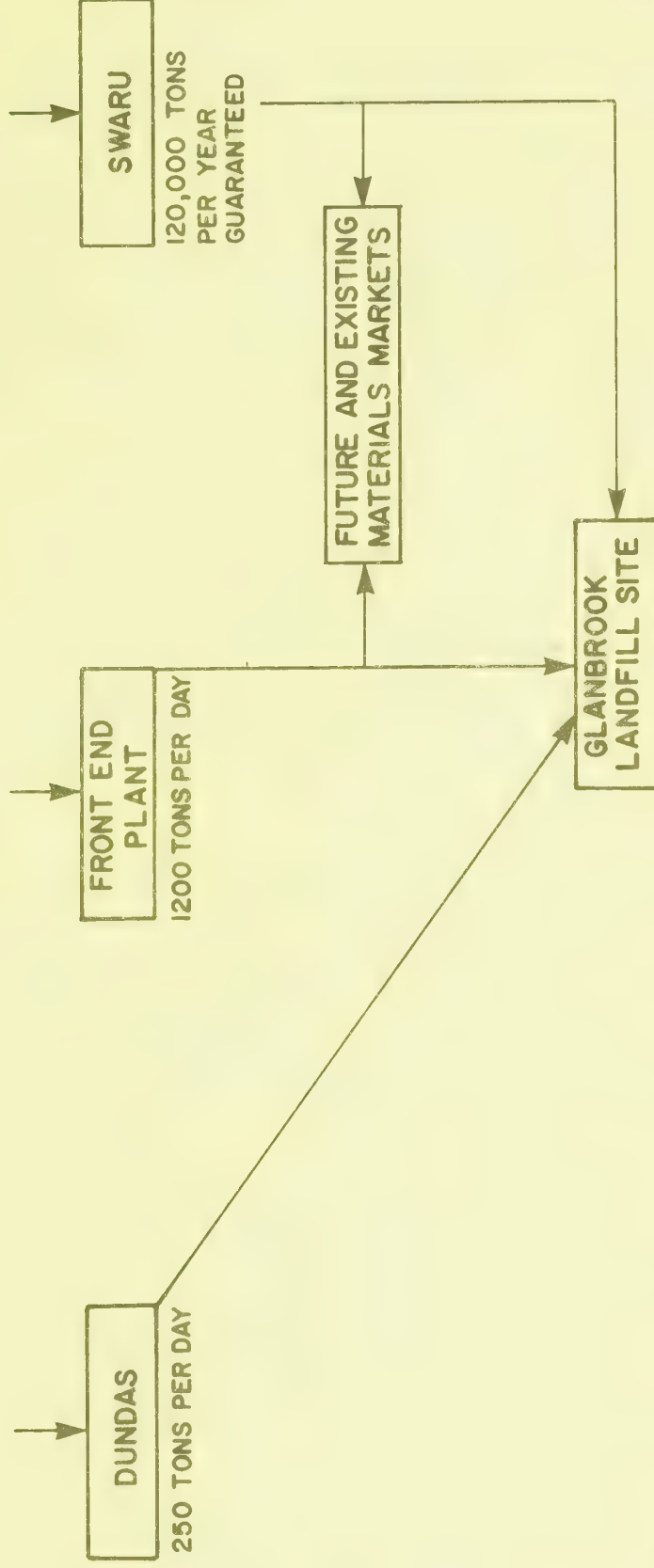


FIGURE 9

Tricil states that this facility would have a capacity of 75 tons per hour or 1,200 tons per 16-hour day.

A separate single push pit transfer station would be installed in Dundas. Raw waste from Dundas would be landfilled at Glanbrook, as would shredded waste from the Kenora Avenue plant. In this system there is no facility at Upper Ottawa Street. SWARU is also operated by Tricil as in the Full Service Contract.

Tricil has not provided a firm bid, either for the capital or operating costs of this system, although it is stated that a firm price can be agreed upon during the negotiation process. Tricil identifies the cost of various components in the front end system. This is useful as not all of these components are eligible for Provincial subsidy and financing under the present programme.

4.6.3 Review of Proposals and General Comments

The Tricil tender is indicative of a well thought out set of approaches to the Region's solid waste management problem. No specific details as to the equipment proposed have been provided, as presumably the firm wishes to maintain a degree of flexibility at this time.

The firm bid for the operation of SWARU and guaranteed tonnages is a very attractive proposition for the Region. The bulk transfer system proposed is a well tried and reliable system, and is a component of a waste management system that is entirely acceptable both from the Region's point of view, and from the aspect of potential for Ministry of the Environment approval.

The capacity of the transfer system proposed is entirely adequate, although the capacity distribution is a matter that should be discussed. The full service contract is the lowest bid for any comprehensive waste management system proposed.



Tricil and its parent company, C.I.L. appears to be strongly committed to waste management systems and resource recovery. The front end plant proposal appears to be feasible, but is yet to be proven operationally in a large scale operation. It is also relatively expensive, even after Provincial subsidies are taken into account, if the RDF cannot be sold. The Full Service Contract is readily adaptable to Resource Recovery. The Tricil conveyor system is used in Kingston to divert part of the wastes into a pilot Resource Recovery Plant, and in Hamilton-Wentworth, in the future, if the Tricil Full Service Contract is adopted, a Resource Recovery system could be 'added on'.

The tender to operate SWARU provides the Region with the opportunity of letting private industry attempt to run the facility efficiently. The bonuses and penalties proposed by Tricil are reasonable. However, the maximum liability of \$500,000 is of considerable concern. We are of the opinion that the Region should have at least one year's notice if the firm intends to withdraw from the facility, irrespective of liability. Possibly this withdrawal could be at the sole option of Tricil, and in lieu of the limited liability clause.

4.6.4 Financial Aspects

The Tricil bids for acceptable wastes are as follows: The amounts shown are adjusted to 10 percent financing and exclude any site improvements at Glanbrook. They include the cost of materials handling, landfilling and SWARU operation and improvements.



	<u>Cost per Capita per Year</u>	<u>Cost per Year</u>
<u>Full Service Contract</u>		
a). Including Glanbrook Operations	\$13.87	\$5,669,000
b). Excluding Glanbrook Operations	10.33	4,219,000
<u>Resource Recovery Proposal*</u>		
a). Without Provincial Subsidy		\$7,689,000**
b). With Provincial Subsidy		\$7,282,000**

* Assumes no income from sale of recovered materials.

** Estimates by Proctor and Redfern Limited

It should be noted that, for the Resource Recovery (front end) proposal, all wastes must be delivered to Kenora or Dundas, and that there are some increased costs to the municipalities and industries for this, compared with all other systems.

The Full Service Contract provides equal transfer capacity at Upper Ottawa and Kenora, which in our opinion, is not commensurate with the locations of waste generation. This problem would be offset by the increased capacity of SWARU, however we are as yet unconvinced that SWARU can be operated 100 percent of the time, and the limited backup in the Kenora facilities is of concern.

Tricil proposes to operate the system 3,100 hours per year.



SECTION 5

RESOURCE RECOVERY



5. RESOURCE RECOVERY

All of the proponents addressed themselves to resource recovery to a greater or lesser extent. This section deals with this aspect of the proposals separately, as this is a matter of considerable significance at this point in time.

5.1 A. Cope and Sons Limited

The Cope approach to Resource Recovery is that the initial systems should be constructed in such a way as to allow for future resource recovery systems at a later date. In addition, Cope proposes to install containers at each of the transfer stations where the public can place paper, glass, ferrous and non-ferrous metals. Selected incoming commercial loads would also be placed in these containers. Cope also suggests that a source separation programme should be initiated in each of the municipalities.

Cope proposes that the Region receive 5 percent of the gross revenue from resource recovery. Reference is made to a subsequent arrangement where the Region would receive 50 percent of the net revenue from resource recovery operations.



5.2 Environmental Waste Systems Inc.

In the EWS tender, reference is made to a BFI Resource Recovery system in Houston, which certain members of the Committee have visited. However, there are no specific proposals for Resource Recovery in Hamilton-Wentworth. Representatives of the firm have stated to us on several occasions that Resource Recovery should not be undertaken until markets are established for the products.

The section in the tender documents relating to the performance of Resource Recovery operations was amended by EWS adding the words 'at the discretion of the contractor'. The firm also deleted reference to the Region being paid any portion of the revenues from Resource Recovery (General Conditions, Clause 25(g)(i) was deleted by a unique addendum).

In summary, it appears that EWS proposes to carry out resource recovery operations if and when they are economically viable in the opinion of EWS, and for the sole financial benefit of EWS.



5.3 Laidlaw Transportation Limited

Laidlaw proposes to install containers at each of the transfer stations, to be operated in much the same way as the Cope proposal. Reference is also made to source separation and front end recovery, but there are no other specific proposals. From the presentations made by Laidlaw, our impression is that there will be hand sorting of marketable items.

In that Laidlaw did not amend the original tender document requirement, a payment of 5% of gross revenues from Resource Recovery will be made to the Region.



5.4 Solid Waste Reclamation Inc.

SWR makes extensive reference to proposed resource recovery operations that will be carried out in connection with the proposed baling operation.

It is proposed that initially cardboard, paper and some metals will be extracted at source (as they enter each transfer station).

SWR estimates the initial quantities of those materials to be recovered as follows:

9,000 tons metal at \$25 per ton

25,000 tons corrugated/paper at \$30 per ton.

SWR proposes to pay 10% of gross revenues from Resource Recovery to the Region. Based on the above estimates the payment would be \$97,500 per year.

In the tender documents and in the interview, SWR made references to considerable efforts that have been made by the company in the areas of product manufacture from solid waste. Some details were revealed, but the Committee was given most of the information in confidence. Letters of intent from certain companies were exhibited.

I. Waxman and Sons is unquestionably an aggressive firm in the field of recovery of materials from wastes. Although some of the SWR proposals appear speculative, past experience would suggest that the firm is as likely as any to be able to implement practical resource recovery processes.



5.5 Tricil Limited

In Section 4.6.2(b) the Tricil Front End Plant proposal was reviewed in detail. Tricil makes no specific proposals for Resource Recovery, other than at SWARU in its Full Service Contract tender.

For the Full Service Contract, Tricil proposes to pay the Region 5% of gross revenues from material recovered at SWARU. Under the Front End Plant proposal, the firm proposes to pay the Region 50% of gross revenues.

Their estimated tonnages and payments to the Region are as follows:

Proposed Contract	Tons per Year	Gross Revenue	Payment to Region
Full Service Contract			
Ferrous Metal	4,000	\$ 96,000	\$ 4,800
Front End Plant (including SWARU)			
Ferrous Metal	17,280	\$ 345,600	\$172,500
RDF*(when market established)	312,000	\$1,560,000	\$780,000

* Tricil assumes that it will be possible to sell the RDF produced by the front end plant for \$5/ton. In our opinion this figure is very optimistic (based on current energy costs). If additional processing of the material, or significant transportation is required the value of the product may be diminished. The value of the RDF is dependent on the process in which it will be used, and the distance of that process from the front end plant.



5.6 Summary

As shown in Figure 10, the percentage payment to the Region for revenues from Resource Recovery varies from 0 for EWS to 50 percent for Tricil Front End. It is important to note that there are no guaranteed revenues, other than from SWARU for all systems other than Tricil Front End, but conversely, the Tricil Front End system is the only one that requires Capital Investment by the Region for the Resource Recovery System.

In our opinion, SWR and Tricil are likely to be the most aggressive in implementing Resource Recovery systems in the future. The SWR systems described to us would be implemented when they are financially feasible, at no direct cost to the Region. The Tricil Resource Recovery System would require direct investment of Regional funds.



HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

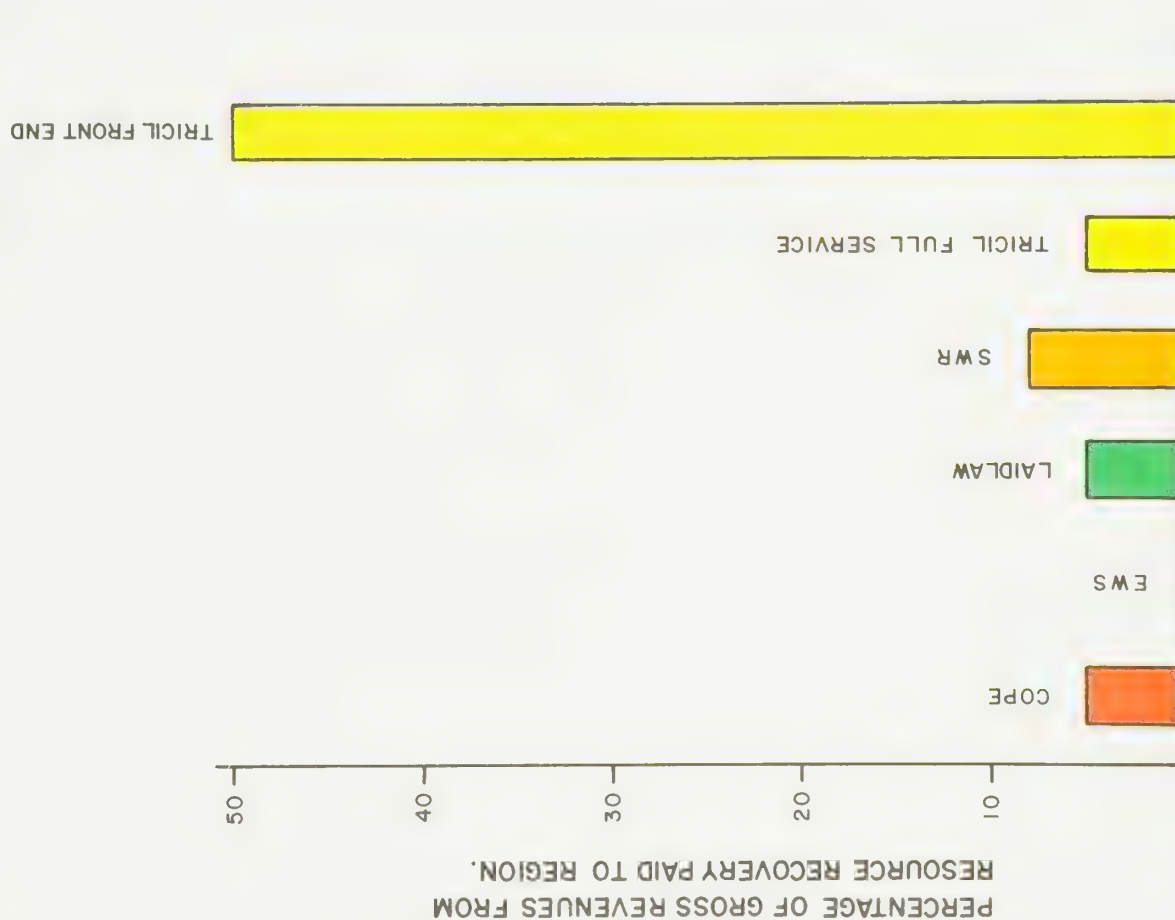


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FIGURE 10

PERCENTAGE OF GROSS REVENUES
FROM RESOURCE RECOVERY TO BE
PAID TO THE REGION.



5.7 Adaptability of Systems to Resource Recovery

5.7.1 Direct Haul (Laidlaw)

This system is the least adaptable of all to Resource Recovery. Since all wastes are hauled directly to the landfill site, the only practical location of separation is at source. It would then be necessary to transport these materials to resource recovery centres. There are advantages to source separation, but a high degree of public and commercial co-operation is required. Laidlaw makes no specific proposals as to how this will occur.

5.7.2 Bulk Transfer (Cope, EWS, Tricil)

This system is readily adaptable to Resource Recovery if the transfer stations are properly designed with future systems in mind.

The Cope and EWS proposals have no conveyor belts. We envisage the tipping floor being designed such that ultimately all or part of the wastes can be pushed onto a conveyor system which would pass through the resource recovery facility and then back to the push pits for residue removal.

In the case of the Tricil system, the conveyor system used is readily adaptable to discharging all or part of the waste stream through a resource recovery system.

5.7.3 Direct Transfer (Laidlaw)

The tipping floor operation in the direct transfer system is much the same as in the Cope and EWS Bulk Transfer Systems. The design of the transfer building can be carried out such that the material can be pushed over to a future conveyor system which delivers the waste into a Resource Recovery System.



5.7.4 Front End System (Tricil)

This system is the typical Front End resource recovery system as envisaged at this point in the development of solid waste technology. It is the type of facility that has been offered by the Ministry of the Environment to six municipalities in Ontario, and the resource recovery components of the system are eligible for a 50% capital subsidy from the Province of Ontario.

5.7.5 Bale Transfer Systems (Cope, Laidlaw, SWR)

The adaptability of baling systems to resource recovery systems as we know them today is more difficult to resolve. It is perfectly feasible to remove some of the incoming stream to the baler station - either from the conveyor that delivers to the baler, or via another system. However, if the residue from the resource recovery system is largely shredded refuse, there appears to be little purpose in baling it prior to landfill.

If the user of RDF is adjacent to the transfer station, the material could be conveyed directly with belts to the user. If the user is remote from the facility, the best use of the baler facility would appear to be baling the wastes, and shredding and separating them adjacent to the RDF user. A remote pyrolytic system could offer the possibility of elimination of the shredding step in the process.

In summary, commitment to a baling system is indicative of lack of expectation of a market for shredded RDF in the immediate future. The combination of baling and shredding in any process appears illogical at this time due to high capital and operation costs and due to the energy intensiveness of such a system.



5.7.6 Summary

Other than the Front End Plant, the Bulk and Direct Transfer systems are the most compatible with Front End resource recovery systems as we now know them. Of these systems, the Tricil system is the one most easily adaptable to a Front End System.



SECTION 6

REVIEW OF FINANCIAL ASPECTS



6. REVIEW OF FINANCIAL ASPECTS AND CAPACITIES OF INDIVIDUAL SYSTEMS AND SYSTEM COMPONENTS

6.1 Introduction

In Section 4 we have identified the 'adjusted' costs of each proposed system. These costs were arrived at by taking the tendered or estimated cost, adjusting the capital components to 10% financing over 10 years, and deducting the cost of all capital improvements at the Glanbrook Landfill Site.

In order to estimate the true cost of each system to the Region, we must also take the following factors into account:

- Allowance for federal and provincial taxes and duties on equipment.

- Allowance for real estate taxes

- Cost of over capacity in system

- Additional costs to the Region at Glanbrook

- Costs to the Region due to changes in staff requirements

- Potential for escalation of system cost

- Utility of system (hours that it will accept wastes)

- Impact of the system on the life of the Glanbrook landfill site

- Revenue to the Region from Resource Recovery operations

- Capital improvements to SWARU

- Cost of SWARU operations

- Restoration of existing sites

- Environmental Hearing Costs

- Allowances made by Contractor for scales



In this section each of these factors will be examined in relation to each system, and the impact of these factors on the total annual cost of each system to the Region will be calculated, assuming that a Contract is signed on October 1st, 1977.



6.2 Federal and Provincial Taxes and Duties

The original tender documents provided for payment of these items by the contractor, as it was intended that he would own the facilities. The status of these items in each of the tenders is as follows:

Cope:	included
EWS:	included
Laidlaw:	included
SWR:	apparently included, according to tender documents, but excluded from baler quotation
Tricil:	included

If the Region decides to finance and own the transfer station facilities, the current legislation appears to be such that a tax rebate will only be available on the buildings, and not on the equipment that they house.

The reduction in capital cost that may be thus achieved is approximately as follows:

Imported Equipment:	zero
Buildings:	5% of gross cost
Canadian equipment:	zero

The reduction in capital cost for each system may, therefore, be calculated approximately as shown in Table 2.



TABLE 2

ESTIMATED REDUCTIONS IN CAPITAL COSTS
DUE TO FEDERAL AND PROVINCIAL SALES TAX REBATES
AND REBATE OF FEDERAL DUTY

System	Gross Building Cost	Reduction in Building Cost
Cope Bulk Transfer	\$1,900,000	\$ 95,000
Cope Bale Transfer	\$2,800,000	\$140,000
EWS Bulk Transfer	\$3,280,000	\$164,000
Laidlaw Direct Haul		
Laidlaw Loose Transfer	\$3,500,000*	\$175,000*
Laidlaw Bale Transfer	\$3,980,000*	\$199,000*
SWR	\$3,980,000	\$199,000
Tricil Full Service	\$4,600,000*	\$230,000*
Tricil Front end Plant	\$6,000,000*	\$300,000*

* Consultant's Estimate.



6.3 Allowance for Real Estate Taxes

The payment of real estate taxes, according to the original contract documents is the responsibility of the contractor. In the tender submissions, the following provisions were made:

- | | |
|----------|---|
| Cope: | Real estate taxes to be billed to Region as paid to local municipality |
| EWS: | No modification to original tender documents |
| Laidlaw: | No modification to original tender documents |
| SWR: | \$75,000 per year for property taxes included in bid - this amount is not subject to escalation |
| Tricil: | No modification to original tender documents. |

In our opinion, the SWR allowance of \$75,000 per year is in the right order of magnitude for real estate taxes on the system in 1977. However, it is likely that such taxes will increase over the 10 year lifetime of the contract, and that, therefore, the average amount of taxes to be paid each year will be higher. The indexing provision for the other contracts should take care of this inflationary trend, and therefore, in our opinion, all of the bids other than Cope are equal.

In order to correct this imbalance the following adjustments should be made to the 1977 price:

- | | |
|-------|-----------------------|
| Cope: | Add \$75,000 per year |
|-------|-----------------------|

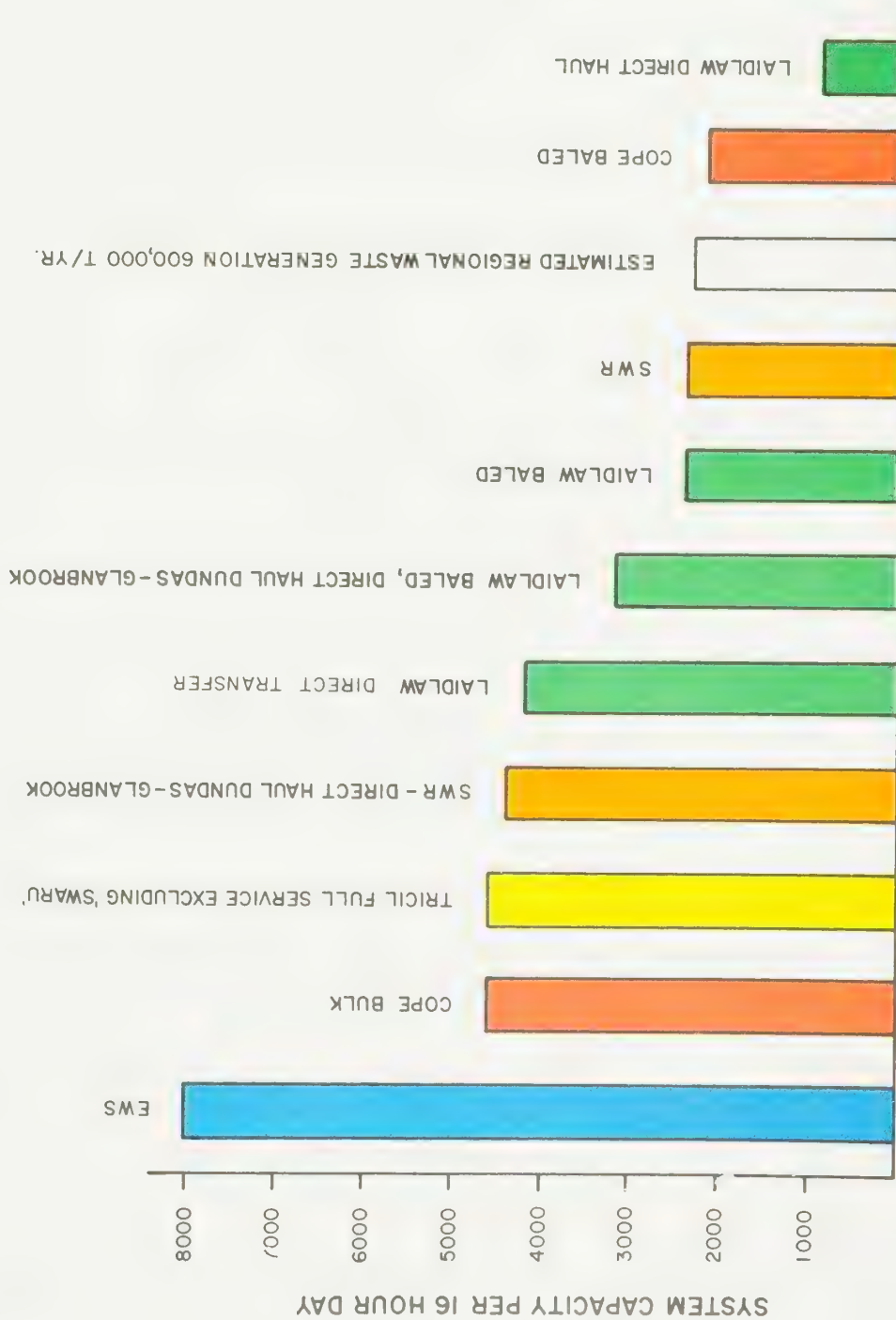


6.4 *Cost of Over-Capacity in System and Impact of System Capacities*

This is a difficult item to evaluate, as different systems have been designed to operate for different periods of time. Table 3 shows the capacity of each system in tons per 16-hour day, and the capital cost per ton - day capacity. Figures 11 and 12 show the same information in graphical form. A 16-hour day was chosen, as, although with the exception of the baling systems and the Tricil Front End Systems, the intent was to operate on a single shift basis, the 16-hour capacity gives an idea of the maximum practical capacity of each system and the backup available should one or more of the units fail.



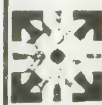
CAPACITIES OF PROPOSED SYSTEMS



NOTE:

CAPACITIES ARE FOR FIXED EQUIPMENT
AND DO NOT INCLUDE ROLLING STOCK,
LANDFILL EQUIPMENT.

FIGURE II

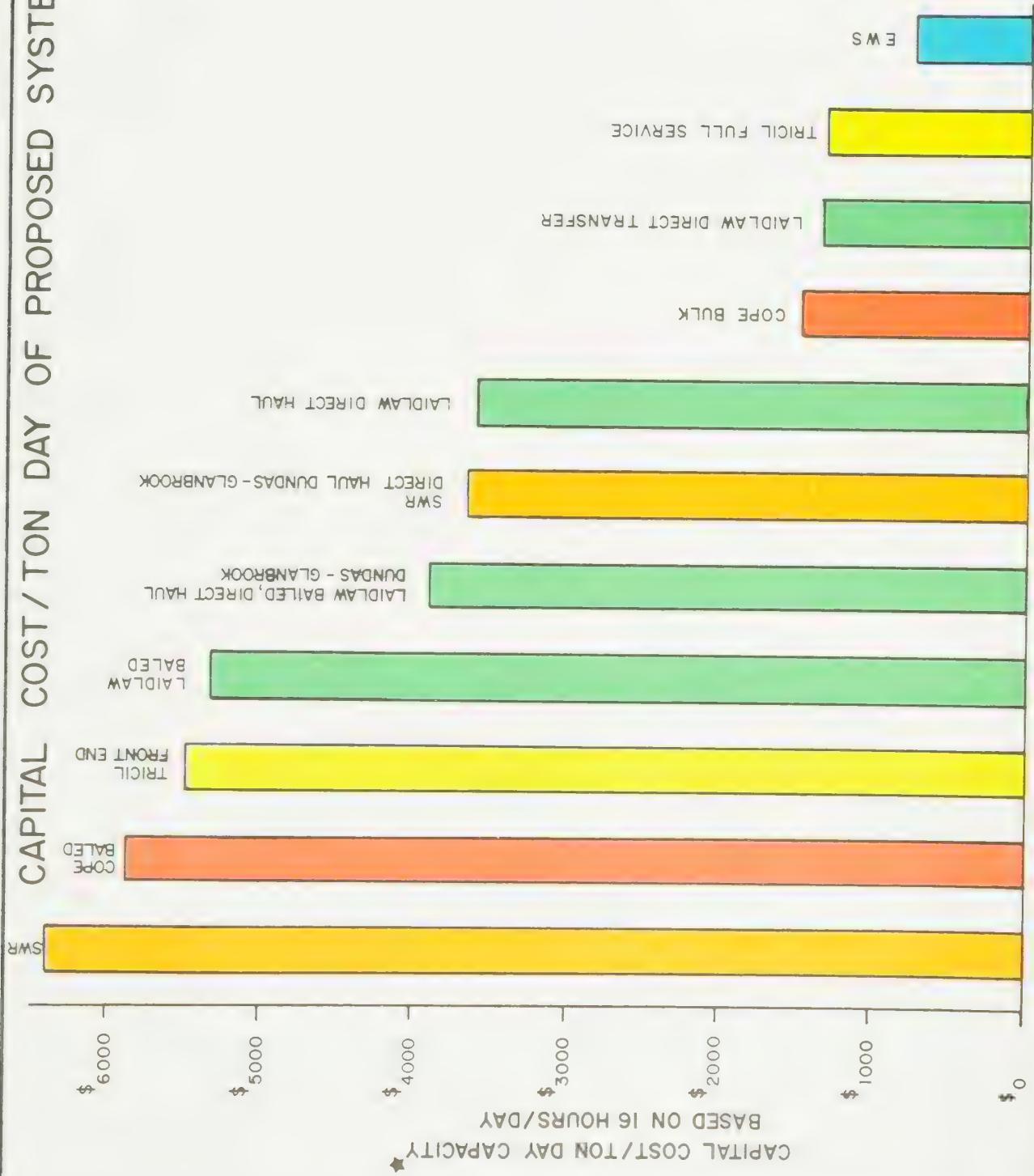


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HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

CAPITAL COST / TON DAY OF PROPOSED SYSTEMS



★ NOTE:

- TON - DAY CAPACITY IS RATED CAPACITY OF SYSTEM AS DEFINED BY CONTRACTOR.
- CAPITAL COST INCLUDES COST OF ROLLING STOCK.

FIGURE 12



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HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM



TABLE 3

CAPACITY OF SYSTEMS

System	Capacity per 16 hours (High Density Balers rated at 50 tons per hour Push Pits, 56.25 tons/hr.	Total Capital Cost including rolling stock landfill equipment (including taxes)	Capital cost/ton day capacity
Cope Bulk	4,500 tons	\$ 6,600,000	\$1,460
Cope Baled	2,100 tons	\$11,000,000	\$5,238
EWS Bulk	8,100 tons	\$ 6,000,000	\$ 740
Laidlaw Direct Haul System	900 tons	\$ 3,000,00	\$3,333
Laidlaw Baled	2,400 tons	\$10,500,000**	\$4,375
Laidlaw Baled with direct transfer			
Dundas-Glanbrook	3,200 tons	\$10,500,000**	\$3,281
Laidlaw Direct Transfer	4,000 tons**	\$ 5,700,000	\$1,425
SWR Baled	2,400 tons	\$13,500,000	\$5,625
SWR with bulk transfer			
Dundas-Glanbrook	4,200 tons	\$31,500,000	\$3,214
Tricil Full service* (bulk transfer)	4,500 tons	\$ 6,250,000	\$1,388
Tricil Front End*	2,100 tons	\$11,250,000	\$5,357

* Excludes SWARU

** Consultant's Estimate

In general, in our opinion, other than the EWS system, none of the proposals envisage an undue amount of over capacity. The high capacity of the EWS system is not reflected in the capital cost provided to us by letter subsequent to our visits to that firm's facilities, and hence the cost per ton-day of capacity (Figure 12) for the EWS system is extremely low. Since EWS has given us very little detail with respect to their proposed system, it is very difficult to ascertain the reason for his apparent discrepancy. Conversely, the EWS operating cost is extremely high - much higher than for any other system, and there is no obvious explanation for this, either.

The push-pit and loose transfer systems, other than EWS all have comparable capacities. The bale transfer systems have lower capacities due to the limitations of the baling machines. The Laidlaw and SWR baling systems have inherent additional capacity, however, if direct haul from Dundas to Glanbrook is possible (and landfill at Glanbrook is permitted, presumably during emergencies). The additional capacity is reflected in Table 3 and Figure 11. No additional capacity is available in the Cope baled system, as Cope proposes a medium density baler at Dundas with direct haul to Glanbrook.

The capacity of each facility in each system per 16-hour day, and the projected waste loading at each facility is shown in Table 4.

All the facilities proposed at Dundas and Upper Ottawa Street are adequate for the anticipated waste generation.

The situation at Kenora Avenue is more complex. In our opinion, the Kenora facility must be at least adequate to accept all the load delivered to it, plus that load normally handled by SWARU, in the event that SWARU is inoperative for any reason. In addition, the total system should have a capacity of approximately 1.5 times the expected



waste loading; based on 24 hour operation, so that in the event that a unit becomes inoperative, wastes can be directed elsewhere. The capacities of each system on a 24-hour a day basis are as follows:

<u>System</u>	<u>Total System Tonnage per Day</u>	<u>Kenora Transfer Station assuming SWARU inoperative</u>
1.5 times expected wastes	3,457	3,033
Cope Bulk	6,650	2,700
Cope Baled	3,150	1,200
EWS Bulk	12,150	6,250
Laidlaw Direct Haul System	1,350	-
Laidlaw Direct Transfer	6,000	3,000
Laidlaw Baled	3,600/4,800	2,400
SWR Baled	3,600/6,100	2,400
Tricil Full Service	5,750	2,700
Tricil Front End	3,150	1,800

The Cope Baler facility at Kenora appears to be inadequate for the wastes generated, particularly when SWARU is inoperative. The other systems are marginally adequate for the average predicted waste load at Kenora including the SWARU load with the exception of the EWS System, which has significant spare capacity even with SWARU inoperative.

The SWR System at Kenora would be able to handle all the wastes in the event that SWARU is inoperative. If one of the balers at Kenora failed, it would be necessary to redirect wastes to Kenora, or to Dundas, and in the latter case, and conventionally landfill the wastes at Glanbrook. The same concept applies to the Laidlaw baled system.

The Tricil Front End system appears to be marginally adequate for handling the Kenora wastes with SWARU inoperative. However, if this facility were to be designed so that its front end could be by-passed, it may be possible to increase the thruput and conventionally landfill wastes during such an event.





TABLE 4
CAPACITIES OF INDIVIDUAL FACILITIES IN SYSTEMS
(tons per 16-hour day)

System	Dundas Transfer Station	Kenora Transfer Station (including SWARU)	Upper Ottawa Street	Total
Consultant's Estimate of 1977 Waste Generation based on 600,000 tons per year	160	1,730	415	2,305
		1,890*		
Cope Bulk	900	1,800	1,800	4,500
Cope Baled	500	800	800	2,100
EWS Bulk	900	4,500	2,700	8,100
Laidlaw Direct Haul System -	-	-	-	900
Laidlaw Direct Transfer	800	2,000	1,200	4,000
Laidlaw Baled	800	1,600	800	2,400/3,200
SWR Baled	1,800	1,600	800	2,400/4,200
Tricil Full Service** (Bulk Transfer)	900	1,800	1,800	4,500
Tricil Front End **	900	1,200	-	2,100

* Includes Dundas Tonnage

** Tricil also proposes to operate SWARU , at 120,000 tons/year

Based on a factor of safety of 1.5, the Cope Baled and the Tricil Front End systems appear to be marginally inadequate.

The inadequacy of the SWR system disappears if wastes can be directed to Dundas and direct-hauled to Glanbrook for conventional sanitary landfill. This concept applies to the Laidlaw baled system, however the improved capacity is more marginal. The Tricil front end system throughput could possibly be improved by by-passing the front end in times of emergencies.

The Laidlaw Direct Haul system capacities are shown for information only. This system does not include handling of commercial/industrial wastes.



SUMMARY

Other than EWS, none of the systems has a high over-capacity, and no deductions from the capital cost should be made in this regard. Based on 24-hours a day operation, the baling systems generally have less excess capacity than the direct transfer or bulk transfer systems.

The Cope baled system appears to have inadequate capacity, particularly at the Kenora location, and should be rejected (i.e. a two baler installation at Kenora is required).

The Tricil and Cope bulk transfer systems provide equal capacities at Kenora and Upper Ottawa, although the anticipated waste loadings at Kenora are much higher. We would prefer to see a re-distribution of these capacities -- three push-pits at Kenora and one at Upper Ottawa rather than two at each. A single push-pit at Upper Ottawa would probably become inadequate during the 10-year life of the contract, however, if there is a large amount of development in the Upper Ottawa contributory area.

The Tricil Front End concept envisages long hauls from above the escarpment to Kenora as the Upper Ottawa Street transfer station is eliminated. This anomaly would be exaggerated with increased development above the escarpment.

The EWS capital cost seems to be very low for the facilities provided.



6.5 Additional Costs to the Region at Glanbrook

By removing the site improvement component from each bid, the analysis of the additional costs to the Region in connection with the Glanbrook site is minimized. Since we are still not aware of the leachate control requirements, we cannot estimate this amount accurately. However, for the purposes of this report these costs have been estimated as follows:

Land:	\$1,000,000
Access Road, Buildings, Fences, etc.	\$1,000,000
Leachate Control System	<u>\$ 500,000 (initial phase only)</u>
Total	<u><u>\$2,500,000</u></u>

After deducting each bidder's allowance for site improvements, if the above amount is added to the capital cost, the Total System capital cost can be evaluated.



6.6 Impact of Systems on Regional Staff Requirements

At present there are six Regional administrative staff assigned either totally or partially to the Regional Solid Waste Management System. In addition, there are 59 full-time Operational staff.

We are of the opinion that any problems with respect to the Disposition of Regional solid waste management staff can be resolved during the detailed negotiations with the successful tenderer.



6.7 Potential for Escalation of System Cost

Clause 10 of the Tendering Information in the original tender documents states that:

'The prices quoted in the tender will be subject to the price escalation formula cited in General Conditions Clause 25(e) commencing 60 full days after the date of tender closing'.

This clause applies as of April 26th, 1977. It was not amended by any of the bidders, and it applies to both capital and operating costs.

There are three categories of bid with respect to escalation:

i). Bids to Which Escalation Clause Applies:

These are: EWS, Laidlaw, and the Tricil tendered system. An escalation factor should be applied to all of these systems to ascertain the bid price at the time of the signature of the contract.

If we assume escalation of 8% per year, and contract signature during October 1977, the escalation factor to be added to these bids should be 4%.

ii). Estimates

The Cope and Tricil Front End bids are based on estimates of the capital costs. We have no way of precisely ascertaining the accuracy of these estimates, but are of the opinion that they should not be considered in the same light as bids. We have added 20% to these estimates



in our summary analysis to compensate for uncertainty and cost escalation. A factor of 4% has been added to the operation cost to compensate for escalation in the cost of operations to October 1977.

iii). SWR Bid

In the answer to the questionnaire, SWR provided copies of firm quotations for equipment and buildings, valid to November 1977. We have taken this into account in our summary of the SWR bid, and we have only added the 4% escalation to those items without firm prices, and the operation component.



6.8 Utility of System

The number of hours that each system will accept wastes, and the cost per hour of each system is shown on Table 5. The cost per hour information is also shown graphically in Figure 13. The costs are based on the 'adjusted' costs (i.e. the bid compensated for removal of landfill capital items) shown in Section 4.

While there should be no suggestion that there is a linear relationship between hours operated and contractual costs, Figure 13 magnifies the relationship between the bids.

Since we do not know the cost of additional hours of operation, it is difficult to compensate in the area of operation costs. Cope proposes to accept wastes for 67% of the specified working hours and EWS proposes to operate 93% of the specified working hours.

The additional costs of extra working hours will only relate to transfer station and landfill site personnel.

Cope shows a total of 26 persons as the transfer station staff.

A reasonable contractual cost for this staff would be \$390 per hour, allowing for overhead, fringe benefits and profit.

Thus, in order to compensate for the lesser working hours, to equalize the bids to those of the other contractors, the following amounts should be added to the annual operation costs of the Cope and EWS bids:

Cope:	1020 x \$390	=	\$397,800
EWS:	200 x \$390	=	\$ 78,000



TABLE 5

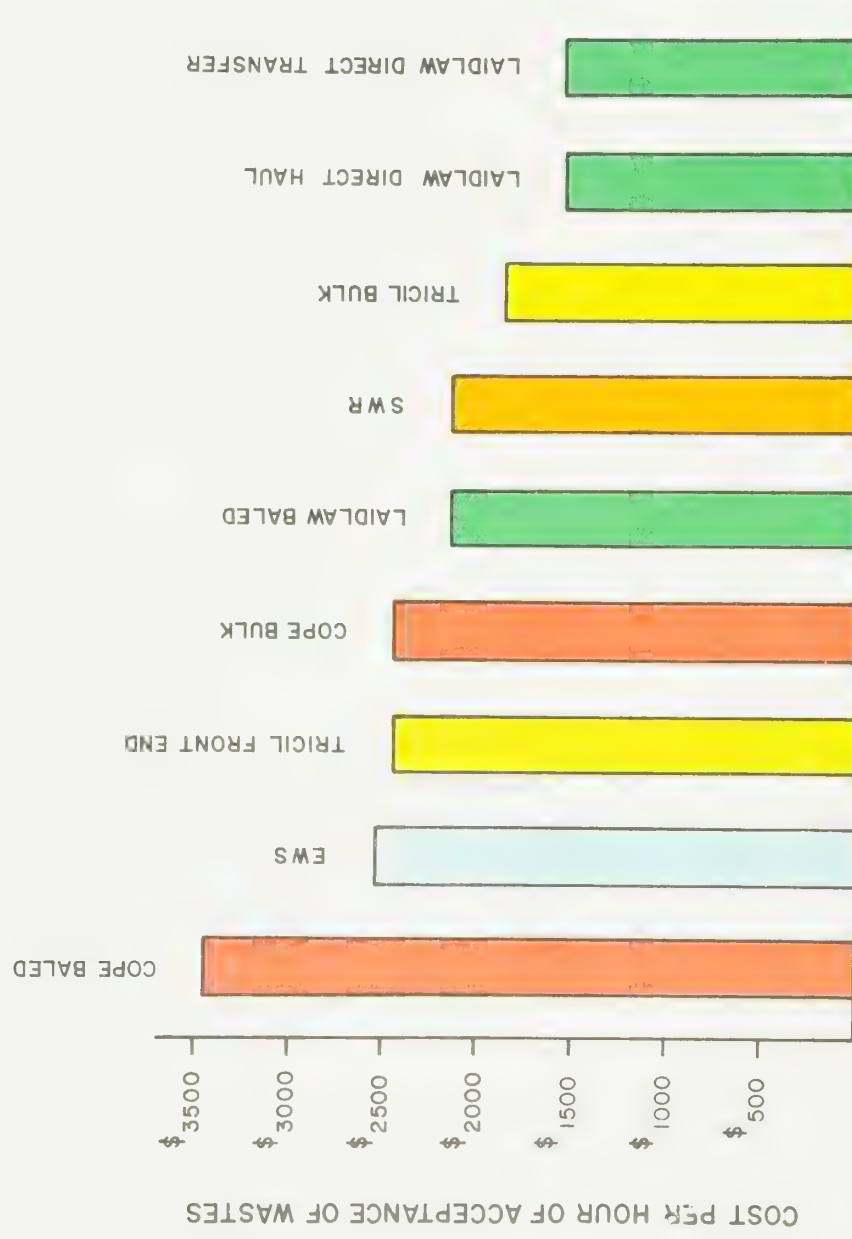
HOURS OF OPERATION OF PROPOSED SYSTEMS

<u>System</u>	<u>Hours per year of operation (hours of waste acceptance)</u>	<u>*Cost per year (600,000 tons)</u>	<u>*Cost per Hour</u>
Cope Bulk	2,080	\$5,064,000	\$2,434
Cope Baled	2,080	\$7,210,000	\$3,466
EWS Bulk	2,900	\$7,463,000	\$2,573
Laidlaw Direct Haul	3,100	\$4,750,000	\$1,532
Laidlaw Direct Transfer	3,100	\$4,750,000	\$1,532
Laidlaw Baled	3,100	\$6,752,000	\$2,170
SWR Baled	3,100	\$6,624,000	\$2,136
Tricil Bulk	3,100	\$5,669,000	\$1,828 *
Tricil Front End	3,100	\$7,689,000	\$2,480 *
Original Tender Documents	3,100		

*Includes operation of SWARU
and Glanbrook Site



COST PER HOUR OF OPERATION OF PROPOSED SYSTEMS



NOTE:

OPERATION IS DEFINED AS TIMES WHEN WASTES ARE ACCEPTED. SYSTEM MAY BE PROCESSING WASTES FOR ADDITIONAL HOURS.

FIGURE 13



Proctor & Redfern Limited
Consulting Engineers and Planners
Hamilton - Canada

Date: JULY, 1977

HAMILTON-WENTWORTH WASTE MANAGEMENT SYSTEM

6.9 Impact of the Systems on the Life of the Glanbrook Landfill Site

Normally, the lifetime of a landfill site may be viewed from two points of view - the length of time it will take to reach a predetermined height for a particular system and set of circumstances or the height of finished landfill after a specified period of time for the same system, and circumstances. Since the site design cannot be finalized for a number of reasons, it is not possible to assist the Region in stating either area of land used up or height of fill. We have designed the table below to assist in evaluating the impact of the systems on the life of the site.

TABLE 6
ANNUAL IN-SITE CAPACITY REQUIREMENT

<u>Type of Landfill</u>	Under Three Circumstances of SWARU Thrput		
	<u>60,000 tons/year (millions of cubic feet)</u>	<u>120,000 tons/year (millions of cubic feet)</u>	<u>180,000 tons/year (millions of cubic feet)</u>
Conventional Sanitary Landfill 30#/cubic feet	3.1	2.7	2.4
Shredded Landfill 45#/cubic feet	2.0	1.9	1.7
Balefill 67#/cubic feet	1.4	1.2	1.1

It can be seen that a balefill operation requires about 50% the in-site space as a conventional site and 60% that of a shredded landfill site. The conclusion is that a balefill need be only 50% and 60% as deep as a conventional or shredded landfill site respectively or conversely cover only 50% or 60% as these other landfill systems respectively.



In our opinion none of the systems result in the Glanbrook site site-life being unduly short and hence not an overriding factor in deciding upon the system being selected. Regardless what system is selected, we would expect that a reasonable height would be established so as to minimize the land area used.

However, there are other variables such as:

- population growth
- per capita waste generation
- resource recovery activities

It is possible to speculate on the impact of these factors based on past experience. However, in our opinion, past experience in the field of solid waste management cannot be a guide to the future. It would appear rational now to expect a reduction in the rate of increase, if not an actual decrease in the per capita production of wastes. Similarly during the lifetime of the landfill site significant advances in the field of resource recovery can be expected. Based on current thinking, a constant rate of solid waste residue production, even with a rising population, is a reasonable assumption. The 3,000,000 cubic foot requirement for conventional sanitary landfill system of disposal appears to be, therefore, the worst possible case.



6.10 Revenue to the Region from Resource Recovery Operations

The estimated revenue to the Region for each system for year 1 is as follows:

Cope: Bulk/Baled	Negligible
EWS: Bulk	Nil
Laidlaw: Direct Haul/ Direct Transfer Baled	Negligible
SWR: Baled	\$97,500
Tricil: Full Service Contract	Negligible
Tricil Front End:	\$124,500*
Tricil Front End:	\$904,500**

* Excluding Ferrous sales from SWARU

** Excluding Ferrous sales from SWARU, based on sale of all RDF produced.

The analysis for Cope, EWS, Laidlaw, and SWR is straightforward -- for Cope, EWS and Laidlaw, no bid adjustment is necessary, and for SWR \$97,500 per year should be deducted from the 'operating cost', as this amount is revenue to the Region. We believe the SWR resource recovery estimate to be reasonable.

For the Tricil tender, it is necessary to take into account the current income to the Region from Resource Recovery (approximately \$15,000 per year from ferrous sales).

For the Tricil Full Service contract, the Region's income from sale of SWARU ferrous will drop to approximately \$5,000 per year (5% of gross sales), hence it is necessary to adjust the Tricil bid by adding \$10,000 per year as this is a 'cost' to the Region.



For the Tricil Resource Recovery Proposal, Tricil proposes to share the revenues with the Region on the basis of 50% of gross sales. Since Tricil assumes an income of approximately \$100,000 per year gross sales of SWARU ferrous, (\$50,000 less \$15,000), \$35,000 additional income should be shown to the Region for SWARU plus the Front End ferrous income of \$124,000 per year.

In order to ascertain an optimistic cost for the Tricil Front End system, we have also calculated the annual cost based on the maximum income projected to the Region (\$904,500 per year).

Another benefit to the Region if all the RDF is sold, is that this material does not have to be landfilled.

Based on Tricil's bid, we estimate the cost of transportation and landfill to be approximately \$4 per ton, thus the additional savings in this area would be approximately \$1,248,000.

Thus the maximum savings in 1977 dollars to the reduced need for landfill and from revenue would be approximately \$2,152,500 per year.
(i.e. \$904,500 + \$1,248,000)



6.11 Cost of Capital Improvements at SWARU

Since the only bidder that offers a firm bid for the operation of SWARU is Tricil, for all the other bids, the cost of capital improvements at SWARU is constant, since this work would be carried out directly by the Region.

Tricil chose not to advise in its reply to the questionnaire the amount of capital it proposes to expend at SWARU for upgrading purposes, however the indication is that the expenditure would be relatively low. Tricil specifically states that the upgrading of the condensers and precipitators at Regional expense has been assumed.

In our opinion, a Regional capital expenditure of \$500,000 on SWARU for all systems is a reasonable assumption, and it is also reasonable to assume that the Tricil Capital Allowance assumes an upgrading cost in the order of \$250,000.



6.12 Cost of SWARU Operation

The Regional cost of SWARU operation per year is budgeted at \$1,692,600 excluding the debenture payments. For all systems other than Tricil, this cost will continue. For the Tricil System the savings will be \$1,638,500 per year, as the Tricil bid does not include SWARU insurance (\$54,100 per year).



6.13 Cost of Restoration of Existing Landfill Sites

This cost has not been estimated at this time,
it is common to all of the proposed systems,
and hence does not affect their relative costs.



6.14 Environmental Hearing Allowance

Although the various bidders quoted different budgets for appearing at Environmental Hearings, only Cope excluded the costs from their bid, and provided for attendance on a per diem basis.

In our opinion it is reasonable to assume that the cost to the contractor for appearing at the hearings will be approximately \$50,000, and therefore this amount has been added to the Cope capital cost.



6.15 Scales

The original tender documents specified that the Region would supply and operate all weighing devices. SWR chose to include scales valued at \$67,000 in their bid. This amount has been deducted from the SWR capital allowance in order to equalize the bids.



6.16 Summary of Costs to the Region for each System

In this section we have summarized the estimated costs to the Region for each system as proposed by each contractor, based on the foregoing assumptions. In all cases the operating cost is assumed to be the difference between the amortized capital cost (10 year loan, blended principal and interest) and the bid price.

It is also assumed that the Region will own the fixed facilities, and that all possible tax rebates will be obtained. This arrangement is financially advantageous to the Region.

The assumed operation period is 3,100 hours per year.

The assumptions in this section are not in all cases entirely consistent with the format of the bid prices received, however, in our opinion the assumptions used could be generally agreed upon in negotiations with a successful contractor.



A. COPE AND SONS: Bulk Transfer System

Estimated Capital Costs

Stated Capital Cost Fixed Equipment	\$2,920,000
Deduct refund of taxes	- 95,000
Add Regional cost of Glanbrook Site acquisition and Improvements	2,500,000
Add 20% of net capital fixed equipment cost for uncertainty and escalation	565,000
Capital Improvements at SWARU	500,000
Environmental Hearing Cost	<u>50,000</u>
Total	\$6,440,000

Estimated Total Annual Operating Costs

Amortization of Capital (10 years, 10%)	\$1,048,110
*Operation Cost at \$7.62 per ton (\$8.62** for tonnages in excess of 560,000 tons per year)	4,612,000
Real Estate Taxes	75,000
*Operation Cost Escalation (4%)	184,480
*Cost of Additional Hours of Operation	397,800
SWARU Operation	1,692,600
SWARU Debentures	908,000
Income from Sale of Metal	<u>- 15,000</u>
Total	<u>\$8,902,990</u>

* Payment to Contractor

** Increased tonnage rate compensates for increased capital
component of system



A. COPE AND SONS: Bale Transfer System

Estimated Capital Costs

Stated Capital Cost Fixed Equipment	\$8,950,000
Deduct refund of taxes	- 140,000
Add Regional Cost of Glanbrook Site acquisition and Improvements	2,500,000
Add 20% of net capital fixed equipment cost for uncertainty and escalation	1,762,000
Capital Improvements at SWARU	500,000
Environmental Hearing Cost	50,000
Total	\$13,902,000

Estimated Total Annual Operating Costs

Amortization of Capital (10 years at 10%)	\$2,262,550
*Operation Cost at \$9.13 per ton (\$12.55** tonnages in excess of 502,000)	5,813,160
Real Estate Taxes	75,000
*Operation Cost Escalation (4%)	232,526
*Cost of Additional Hours of Operation	397,800
SWARU Operation	1,692,600
SWARU Debentures	908,000
Income from Sale of Metal	- 15,000
Total	\$11,366,636

* Payment to Contractor

** Increased tonnage rate compensates for increased capital component of system.



ENVIRONMENTAL WASTE SYSTEMS INC. - (Bulk Transfer)

Estimate of Operating Cost to Contractor

Stated Capital Cost Fixed Equipment	\$5,000,000
Stated amortization cost (10 years at 11%)	849,325/year
Therefore, operating cost = (\$7,680,000 - \$849,325)/year =	\$6,830,675/year

Estimate of Capital Cost

Stated Capital Cost	\$5,000,000
Add Regional Cost of Glanbrook Site acquisition and improvements	2,500,000
Deduct Estimated Capital Allowance Glanbrook Site	-1,000,000
Deduct refund of taxes	- 164,000
Add 4% of net capital cost (escalation)	193,440
Capital Improvements at SWARU	500,000
Total	<u>\$7,029,440</u>

Estimated Total Annual Operating Costs

Amortization of Capital (10 years at 10%)	\$1,144,041
*Operation Cost	6,830,675
*Operation Cost Escalation (4%)	273,227
Cost of Additional Hours of Operation	78,000
SWARU Operation	1,692,600
SWARU Debentures	908,000
Income from sale of Metal	- 15,000
Total	<u>\$10,911,543</u>

* Payment to Contractor



LIDLAW TRANSPORTATION LTD - Direct Haul System

Estimate of Operating Cost to Contractor

Stated Operating Cost	\$4,991,454.52
Estimated Capital Allowance (Glanbrook Improvements) \$250,000 at 10-1/4% =	40,750/year
Therefore, operating cost = (\$4,991,454.52 - \$40,750) =	\$4,950,704/year

Estimate of Capital Cost

Deduct Capital Allowance Glanbrook Site	-\$ 250,000
Add Regional Cost of Glanbrook Site acquisition and Improvements	\$2,500,000
Capital Improvements at SWARU	\$ 500,000
Total	<u>\$2,750,000</u>

Estimated Total Annual Operating Costs

Amortization of Capital (10 years at 10%)	\$ 447,562
*Operation Cost	4,950,704
*Operation Cost Escalation (4%)	198,028
SWARU Operation	1,692,600
SWARU Debentures	908,000
**Cost to Industry for Extra Haul @ \$3.40/ton	1,634,032
Savings to municipalities for collection systems	-2,529,426
Income from Sale of Metal	<u>- 15,000</u>
Total	<u>\$7,286,500</u>

* Payment to Contractor

** Calculation



LIDLAW TRANSPORTATION LIMITED - Direct Transfer System

Estimate of Operating Cost to Contractor

Assumed Capital Cost Fixed Equipment	\$3,500,000
Add Glanbrook allowance \$250,000	250,000
Cost per year (10 years at 10-1/4%)	611,250
Therefore, operation cost =	
(\$4,991,454.52 - \$611,250) =	\$4,380,204/year

Estimate of Capital Costs

Assumed Capital	\$3,750,000
Deduct Allowance for Glanbrook Improvements	- 250,000
Deduct refund of taxes	- 175,000
Add Regional Cost of Glanbrook Site Improvements and Acquisition	2,500,000
Add 4% of net capital escalation	133,000
Capital Improvements at SWARU	<u>500,000</u>
Total	\$6,458,000

Estimated Total Annual Operating Costs

Amortization of Capital (10 years at 10%)	\$1,051,039
*Operation Cost	4,380,204
*Operation Cost Escalation (4%)	175,208
SWARU Operation	1,692,600
SWARU Debentures	908,000
Income from Sale of Metal	<u>- 15,000</u>
Total	<u>\$8,192,051</u>

* Payment to Contractor



LAILAW TRANSPORTATION LIMITED - Baled Transfer System

Estimate of Operating Cost to Contractor

Assumed Capital Cost, Fixed Equipment	\$10,780,000
Glanbrook Allowance (add)	250,000
Cost per year (10 years at 10-1/4%)	1,797,890
Therefore, operation cost to contractor = (\$6,992,937.92 - \$1,797,890) =	5,195,047/year

Estimate of Capital Costs

Assumed Capital	\$11,030,000
Deduct Allowance for Glanbrook Improvements	- 250,000
Deduct Refund of Taxes	- 199,000
Add Regional cost of Glanbrook Site Improvements and Acquisition	2,500,000
Add 4% of net capital cost (escalation)	443,240
Capital improvements at SWARU	500,000
Total	\$14,024,240

Estimated Total Annual Operating Costs

Amortization of Capital (10 years at 10%)	\$ 2,280,811
*Operation Cost	5,195,047
*Operation Cost Escalation	207,801
SWARU Operation	1,692,600
SWARU Debentures	908,000
Income from Sale of Metal	- 15,000
Total	\$10,269,259

* Payment to Contractor



SOLID WASTE RECLAMATION INC. - (Baled Transfer)

Estimate of Operating Cost to Contractor

Capital Cost, Fixed Equipment and Glanbrook Allowance	\$11,781,000
Cost per year (10 years at 10-1/4%)	1,920,303
Therefore, operation cost to contractor = (\$6,990,000 - \$1,920,303)	5,069,697/year

Estimate of Capital Costs

Stated Capital	\$11,781,000
Deduct Allowance for Scales	- 67,000
Deduct Allowance for Glanbrook Improvements	- 1,000,000
Deduct refund of Taxes	- 199,000
Add Regional cost of Glanbrook Site Improvements and Acquisition	2,500,000
No capital escalation	---
Capital Improvements at SWARU	<u>500,000</u>
Total	\$13,515,000

Estimate of Total Annual Operating Cost

Amortization of Capital (10 years at 10%)	\$ 2,199,566
*Operation Cost	5,069,697
*Operation Cost Escalation (4%)	202,787
SWARU Operation	1,692,600
SWARU Debentures	908,000
Income from Sale of Metal	- 15,000
Income from other Resource Recovery	<u>- 97,500</u>
Total	<u>\$ 9,960,150</u>

*Payment to Contractor



TRICIL LIMITED - Full Service Contract

In the Tricil bids it is necessary to take into account that the per capita price is for 600,000 tons including SWARU, whereas all the other bids (excluding Cope) exclude SWARU.

In order to make the Tricil bids comparable with those of the other proponents we have increased the Tricil operating cost so that their total system becomes capable of handling 660,000 tons per year (i.e. equivalent to 600,000 tons transfer and 60,000 tons per year SWARU current production for all of the other systems). This means that we assume 540,000 tons per year for the transfer system and 120,000 tons per year at SWARU for the Tricil System.

Estimate of Contractor's Operating Cost

Estimated Capital	\$5,000,000
Cost of Capital per year at 10-1/4%	815,000
Therefore, operating cost =	
\$5,880,448 - \$815,000 -	5,065,448/year

Estimate of Capital Costs

Estimated Capital (no Glanbrook improvements included)	\$5,000,000
Add Regional Cost of Glanbrook acquisition and Improvements	2,500,000
Deduct Refund of Taxes	- 230,000
Capital Escalation (4%)	190,800
Capital Improvements at SWARU	500,000
Total	\$7,960,800



Tricil (continued)

Estimate of Total Annual Operating Cost

Amortization of Capital (10 years at 10%)	\$1,295,620
*Operation Cost (assumed to be \$3,096,448 if SWARU excluded)	5,065,448
*Escalation of Operation Costs	202,617
*Adjustment to Operating Cost increasing materials handling tonnage 480,000 - 540,000 ($\$3,096,448 \times 0.125 \times 1.04$)	402,538
SWARU Debentures	908,000
SWARU insurance	54,100
Revenue from metal sales	<u>- 5,000</u>
Total	<u>\$7,923,323</u>

* Payment to Contractor



TRICIL FRONT END SYSTEM

For this system there are four alternatives or Cases:

- 1). No Provincial Subsidy, minimum Resource Recovery
- 2). No Provincial Subsidy, maximum Resource Recovery
- 3). Provincial Subsidy, minimum Resource Recovery
- 4). Provincial Subsidy, maximum Resource Recovery.

Subsidizable Amount

Stated estimated Capital Cost of fixed components of system and shakedown = \$9,567,000. Of this amount, assume \$5,000,000 is potentially subsidizable.

The quoted capacity of this system excluding SWARU is 1,450 tons per day. In order to make the system comparable with the other proposals, we have adjusted capital and operating costs to bring the operating capacity excluding SWARU to 2,075 tons per day (540,000 tons per year).

The estimated costs do not include those costs to industry and the municipalities due to the elimination of the Upper Ottawa Street transfer station.

CASE 1 - No provincial subsidy - minimum resources recovered.

Estimate of Capital Costs

Fixed System components	\$9,567,000
Add Regional Cost of Glanbrook acquisition and improvements	2,500,000
Deduct Refunds of Taxes	- 300,000
Escalation of Net Capital and allowance for Uncertainty of Estimate	1,853,400
Capital Improvements at SWARU	500,000
Additions to Capital to bring system without SWARU to 540,000 tons per year	<u>4,781,772</u>
Total	<u>\$18,902,172</u>



CASE 1 (continued)

Estimate of Total Operating Cost

Amortization of Capital (10 years at 10%)	\$3,076,328
*Operation Cost of Resource Recovery Plant	938,000
*Transfer Costs	800,000
*Dundas Transfer Costs	166,000
*Escalation and Uncertainty Allowance for Operating Cost	380,800
*Additional Operating Cost to bring to 540,000 tons per year	984,482
SWARU Operation* (estimate)	1,969,000
SWARU Debenture	908,000
SWARU Insurance	54,100
*Glanbrook Operation	1,450,000
*Adjustment to Glanbrook Operation for tonnage increase from 480,000 to 540,000 tons/year	362,500
Income from Sale of Ferrous	- 50,000
	<hr/>
Total	\$11,039,210

* Payment to Contractor

CASE 2 - No Provincial Subsidy - Maximum Resource
Recovered

The only difference between Case 1 and Case 2
is increased revenue from resource recovery for
Case 2.

In Section 6.10 we estimated the maximum reduction
in system cost to be \$2,152,000 per year. This
was based on sales of 312,000 tons of RDF per year.
In fact, for a 680,000 ton/year system, which is
equivalent to the other bids, the following tonnages
would apply:

SWARU: 460 tons/day (based on 5-day week)
Dundas: 350 tons/day: direct to Glanbrook
Kenora Front End: 1,725 tons/day



Thus the savings due to sale of 1,725 tons per day of RDF and associated material would be
 $\$2,152,000 \times 1.725/1.2 = \$3,093,500$

Therefore, the annual operation cost for Case 2 would be $\$11,039,210 - 3,093,500 = \$7,945,710$ per year.

CASE 3 - Provincial Subsidy - Minimum Resource Recovered

This option is the same as Case 1 but subsidy is received from the Province of Ontario. We estimate the potential subsidy to be \$2,500,000. We have continued to use 10 years at 10% financing for the facilities, as we feel that longer term financing for this type of equipment cannot be justified.

The \$2,500,000 subsidy increases to \$3,600,000 for a 1,725 ton per day Front End Plant (which is our 'comparable system').

The capital cost therefore, is $\$18,902,172 - \$3,600,000 = \$15,302,172$

The cost of amortization is \$2,490,428 per year, and hence the operating cost is reduced by $(\$3,076,328 - \$2,490,428) = \$585,900$ per year.

CASE 4 - Provincial Subsidy - Maximum Resource Recovered

This option is the same as Case 3 but with increased revenue from resource recovery, as in Case 2.

Hence the operating cost for Case 4 = $(\$10,453,310 - \$3,093,500) = \$7,359,810$ per year.



The annual cost to the Region, therefore, for each system, in order of increasing cost is as shown on Table 8. (This information is shown graphically on Figure 14).



TABLE 7

ESTIMATED ANNUAL COST¹
TO THE REGION FOR EACH SYSTEM

<u>Bulk and Direct Transfer Systems</u>		<u>Bale Transfer Systems</u>		<u>Direct Haul² System</u>	<u>Resource Recovery System³</u>
Tricil Bulk	\$7,923,323	SWR	\$9,960,150	Laidlaw	Tricil Case 4 \$7,359,810
Laidlaw Direct Transfer	\$8,192,051	Laidlaw	\$10,269,259		Tricil Case 2 \$7,945,710
Cope Bulk	\$8,902,990	Cope	\$11,366,636		Tricil Case 3 \$10,453,310
E.W.S. Bulk	\$10,911,543				Tricil Case 1 \$11,039,210

The Proctor and Redfern estimate for this work updated to October 1977 was \$9,413,000 per year.

Notes:

1. Regional Annual Cost is for handling 660,000 tons of acceptable wastes per year including 60,000 tons at SWARU (for the Tricil System 120,000 tons at SWARU). This cost does not include the cost of rehabilitating existing landfill sites, scales operation, government approvals, Regional Engineering costs, and end use development of the Glanbrook Sanitary Landfill.
2. The Direct Haul System cost reflects a saving of \$2,529,426 per year to the local municipalities for the elimination of their collection systems and a \$1,634,032 additional annual cost to industry for additional haul compared with the current situation.
3. Resource Recovery Cases 1 and 2 assume no Provincial Subsidy, Cases 2 and 4 assume maximum income from Resource Recovery, which we are of the opinion is unrealistic in the immediate future. The realistic estimated cost for the Resource Recovery System is Case 3. (Provincial Subsidy, minimum income from sale of materials:) \$10,453,310 per year.



SECTION 7

IMPACT OF SELECTED VARIABLES ON COST



7. IMPACT OF SELECTED VARIABLES ON COST

7.1 General

Since the interest rate at which the system is to be financed may vary from the 10% assumed, we have analyzed the effect of 8% and 12% interest rates on the total system cost. Clearly the most capital intensive systems are the most sensitive to changes in interest rates.

There is a possibility that the actual tonnage may be different from the 600,000 tons per year defined in the original contract documents. The Tricil transfer, Laidlaw and SWR systems are essentially fixed bids, irrespective of the tonnage, whereas the Cope, EWS and Tricil Front End systems have tonnage dependent costs. Nevertheless, if the tonnage is substantially different from that proposed, it would be reasonable to expect during the negotiation stage that the fixed bidders would adjust their capital and labour allowances, and hence their bids.



7.2 Sensitivity to Changes in the Interest Rate

The effect of a change in the interest rate is to change the amount shown as 'amortization of capital' for each system in Section 6.16. The total annual operating costs for 8%, 10% and 12% capital financing are shown in Table 9.

The order of each system in terms of annual cost to the Region is shown in Table 10.

The only systems for which changes in interest rates have a significant cost effect are the Tricil Front End systems -- this is due to the high capital investment (over \$18,000,000 total) required for their systems.

Generally we have concluded that changes in interest rates are of little significance in system selection.



TABLE 8

TOTAL ANNUAL OPERATING COST
TO THE REGION FOR DIFFERENT
RATES OF INTEREST ON CAPITAL
(10 years Amortization)

System	8%	10%	12%
Cope Bulk	\$ 8,814,634	\$ 8,902,990	\$ 8,994,631
Cope Baled	11,175,901	11,366,636	11,564,446
EWS Bulk	10,824,488	10,911,543	11,011,572
Laidlaw Direct Haul System	7,248,770	7,286,500	7,625,633
Laidlaw Direct Transfer	8,103,447	8,192,051	8,283,948
Laidlaw Baled Transfer	10,076,984	10,269,259	10,468,682
SWR Baled	9,794,724	9,960,150	10,172,468
Tricil Full Service (Bulk)	7,824,001	7,923,323	8,046,505
Tricil Front End Case 1	10,779,872	11,039,210	11,359,224
Tricil Front End Case 2	7,686,372	7,945,710	8,265,724
Tricil Front End Case 3	10,243,364	10,453,310	10,671,060
Tricil Front End Case 4	7,149,864	7,359,810	7,577,560



TABLE 9

ORDER OF ANNUAL COST TO THE REGION
FOR EACH SYSTEM FOR DIFFERENT
INTEREST RATES

(lower numbers indicate
lower costs to the Region)

System	Interest Rate		
	8%	10%	12%
Cope Bulk	6	6	6
Cope Baled	12	12	12
EWS	11	10	10
Laidlaw Direct Haul System	2	1	2
Laidlaw Direct Transfer	5	5	5
Laidlaw Bale Transfer	8	8	8
SWR	7	7	7
Tricil Full Service	4	3	3
Tricil Front End, Case 1	10	11	11
Tricil Front End, Case 2	3	4	4
Tricil Front End, Case 3	9	9	9
Tricil Front End, Case 4	1	2	1



7.3 Sensitivity to Changes in Tonnage

All of the amounts shown on Table 9 are for the following annual tonnages.

With the exception of Tricil, 600,000 tons handled by the transfer system and 60,000 tons handled by SWARU (total 660,000 tons). For Tricil the transfer tonnage is 540,000 tons per year and the SWARU tonnage is 120,000 tons per year (660,000 tons).

In order to ascertain the effect of decreased tonnages on costs to the Region, we have estimated the bid of each contractor for each system for 400,000 and 500,000 tons per year excluding SWARU. We have not included the details of these analyses herein as they are based on a number of assumptions that are not defined in the bids and questionnaires received. Nevertheless, based on our analysis, we are able to state that, in our opinion, there will be no significant change in the relative standing of each of the systems from a total annual cost viewpoint if the annual tonnage is either 400,000 or 500,000 tons per year rather than the specified tonnage of 600,000 tons per year. In other words, if the system is selected on the basis of a 600,000 tons per year system, the criteria for selection will also apply to a 400,000 or a 500,000 tons per year system.



SECTION 8

COMPARISON OF DIFFERENT TRANSFER SYSTEM TYPES



8. COMPARISON OF DIFFERENT TRANSFER SYSTEM TYPES

8.1 General

The Region has received bids for five basic transfer system types, as follows:

Direct Haul System:	Laidlaw
Direct Transfer:	Laidlaw
Bulk Transfer:	Cope, EWS, Laidlaw, Tricil
Bale Transfer:	Cope, Laidlaw, SWR
Shredded Transfer/Resource Recovery:	Tricil

The direct haul, direct transfer and bulk transfer systems all result in the deposition of uncompacted wastes at the landfill site. The Bale and Shredded transfer systems, of course, result in the deposition of baled and shredded waste at the landfill site.

In 1976 Proctor and Redfern recommended the bale transfer system to the Region, based on the following premises:

- 1). Baled Transfer has approximately the same cost as direct or bulk transfer.
- 2). A balefill site has the lowest rate of leachate generation and the lowest rate of use of land for landfill.
- 3). The bale transfer system appears to have a high likelihood of public acceptance.

The Tricil, Cope and Laidlaw bulk and direct transfer bids are lower than the baled transfer bids and Proctor and Redfern Limited estimate in the 1976 report. However, the EWS bulk transfer bid is higher. In general, we conclude that all the bids received by the Region for bulk transfer other than EWS are extremely competitive.



The low rate of leachate generation in a balefill site may turn out to be advantageous or disadvantageous. Then requirement for a leachate collection system will be more clearly defined following the completion of the Gartner Lee Report on the Glanbrook Site.

As noted in Section 8.2 'Hydrogeological Aspects - Baled Refuse', prepared by Gartner Lee and Associates Limited, a balefill site will produce lower volumes of higher concentration leachate over a longer period of time than any other form of sanitary landfill. If the Glanbrook site requires a leachate collection system, this would mean that the system would have to be maintained for a much longer period of time for baled waste than for loose or shredded waste. This would be of considerable concern, if, for example, the leachate control system required trucking. We are almost certain that some form of leachate collection and treatment system will be required at Glanbrook.

There are possible methods of abating this problem, the most obvious being the prevention of rainwater entering the refuse cells by placing an impermeable membrane or rainwater collection system on top of the finished site. We do not suggest now that balefill is an unacceptable solution, but that there are unanswered questions with respect to the concept as it relates to the Glanbrook site.

Since the concept of balefill has been introduced to the public, it has received relatively wide acceptance. The lack of odour, and the good aesthetics of the system are very attractive. These two factors are significant, and cannot be ignored. However, our analysis has shown that a balefill system will result in a cost of \$2,000,000 per year more to the Region than for a bulk or direct transfer system. In our opinion the cost savings for the bulk or loose transfer systems outweigh the advantages of a bale transfer system, provided that the landfill heights for alternative systems are acceptable.



A properly run sanitary landfill site, which accepts loose or shredded wastes is an acceptable method of solid waste disposal, which will be approved by the Ministry of the Environment. Conventional and shredded landfill sites generate leachate at a faster rate than balefill sites, however this may be advantageous, as the length of time over which the leachate must be managed is shorter than for balefill sites. Since balefill is a denser form of landfill, it results in a lower landfill area. The acceptability of landfill height, within certain limits is a subjective matter.

In summary, there are advantages and disadvantages in all forms of sanitary landfill. Conventional sanitary landfill is an acceptable method of solid waste disposal and is approvable by the Ministry of the Environment. We have no hesitation in recommending the conventional sanitary landfill system as the preferred method of solid waste management.

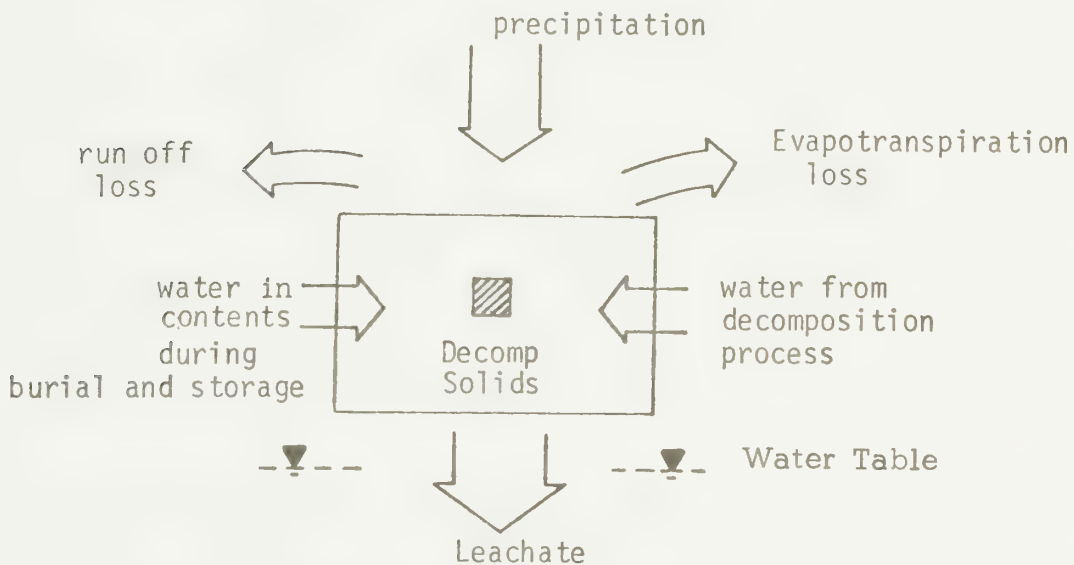


8.2 Hydrogeological Aspects - Baled Refuse
Prepared by Gartner Lee and Associates

Part of the decomposition process in every land-fill is the production of leachate. Leachate quality and quantity depend upon

- 1). The chemical and physical characteristics of the waste, age of burial.
- 2). The relationship of the waste to the water table.
- 3). The climate and time of the year.
- 4). The operational aspects - type of cover
 - degree of compaction
 - surface slope, etc.

The sketch below shows the moisture relationships.



The above assumes that waste is placed above the water table. If the waste is placed below the water table then the ground water flow through will also be considered as calculated by Darcy's law, $Q = kiA$.



If one considers baling of waste, the compaction will tend to lower the coefficient of permeability as the waste becomes more dense. Therefore water infiltration via precipitation and/or ground water flow would be reduced accordingly. As well as reducing quantity of flow the velocity would also be reduced.

Assuming that normal garbage has a permeability in the sand textured soil range (10^{-3} cm/sec+) then baled garbage might be expected to be that of a silt to a sandy silt till (10^{-4} to 10^{-5} cm/sec+). Infiltration of precipitation into an active garbage cell would probably be 12 to 18 inches per year while infiltration into bales might be in the 4 to 6 inches per year on the average. Unfortunately there is a lack of data to quantify this.

Although less water would pass through the waste the increase in density would increase the potential loadings on the system. As well, total mass of ions available for leaching must remain constant. Therefore the leachate quantities may be reduced however, quality once breakthrough is achieved, could be potentially worse.

With slower percolation through the bales, the time required for stabilization would be elongated possibly by a factor of several times. Stabilization times of normal refuse is in terms of decades. When infiltration is minimized stabilization times are increased. This becomes a critical factor if leachate collection and treatment are required at any site.

It should be remembered that no leachate will issue from the bale until all of the refuse reaches field capacity. This time factor may be one of the problems with past experiments recorded.



In conclusion, it appears that

- a). Baled refuse will produce leachate possibly at reduced rates but over a long period of time.
- b). Baled refuse will increase loadings on the system.

Therefore baling of refuse probably does not supply environmental benefits from a hydro-geological point of view. At sites where leachate requires collection it could prove a severe disadvantage due to the long time frames. Total loadings would be more severe and could be very important unless significant dilution is available.

The benefits of baling are operational and of a housekeeping nature.

Shredding of waste would provide a more uniform product. Surface area available for contact with water would be increased such that leaching would probably be enhanced. As a result where infiltration is encouraged, leachate would probably be created more rapidly. Quality of initial leachate would be fairly severe and then begin to taper off. Stabilization times would be more rapid. Therefore, where leachate collection is envisaged this could potentially be an asset if the concentrations and volumes can be handled.



8.3 Review of System Types

In this section each type of system proposed is revealed, and the committee's opinion regarding the acceptability of the system to the Region is given.

8.3.1 Direct Haul

For all variations in tonnage and capital interest rate, this system has the lowest cost. It essentially involves a takeover of the area municipalities' collection systems by the Region and requires that all industries and private vehicles haul directly to Glanbrook.

We estimate that this system would result in about 500 round-trip vehicle trips per day to Glanbrook, rather than about 75 for the transfer systems. Furthermore, the system provides no foundation for resource recovery, since no materials handling facilities are established. Since it is a labour/energy intensive system, it is likely to be sensitive to inflation of costs in these areas. In our opinion, although this is the lowest cost system, it should be rejected for the reasons which are summarized below.

High traffic generation at Glanbrook

No foundation for resource recovery

Labour,energy/intensity of system.



8.3.2 Direct Transfer

The direct transfer system, as bid by Laidlaw has a somewhat higher cost than the lowest cost bulk transfer system. The landfill methods for bulk and direct transfer are identical.

In our opinion, the direct transfer system is an acceptable method of solid waste management for the Region. It has a number of important attributes:

Lack of machinery

Relatively straightforward adaptability to Resource Recovery

Low capital cost.

The disadvantages of the system are:

Lack of significant experience in cold climates

Higher operation cost than the lowest cost bulk transfer system

In many ways the direct transfer system is the ideal interim solution to the Region's solid waste problem. For a relatively low investment a good materials handling system is established. The transfer stations can easily be designed so that all or part of the wastes can be diverted to a resource recovery system, or alternatively, the transfer stations could in future receive the residue from such a system, via conveyor belts, together with materials that by-pass the resource recovery system. The lack of machinery appears to render the system almost foolproof. However, we are slightly concerned about the unloading capability of the trailers in cold weather.

Evidence available, however, indicates that even if the transfer building is unheated, the refuse will generate sufficient heat to prevent freezing and sticking to the trailer sides and mechanisms. We believe that even if freezing is a problem, it is not insolvable.

Visits by the Committee to direct transfer systems in Seattle, Eugene and San Fransico have shown that this can be a very aesthetic and attractive system of managing solid waste.



8.3.3 Bulk Transfer

As noted in Section 8.3.2, the bulk transfer system as bid by Tricil has a lower cost than the Laidlaw direct transfer system. The Cope bid is somewhat higher, and the EWS bid is significantly higher.

In our opinion, this system is an acceptable method of solid waste management for the Region. Its important attributes are:

Adaptability to Resource Recovery

High unit throughput capability

Moderate capital cost

Relatively low operating cost.

The disadvantages of the system are:

More machinery than direct transfer and hence higher vulnerability to breakdown.

The system is adaptable to resource recovery in the same ways as the direct transfer system. The Tricil system of bulk transfer is the most readily adaptable to resource recovery, as it has a built-in conveyor system.

The push-pits in a bulk transfer system each have a capacity of approximately 450 tons per 8-hour day, thus a five push-pit system has a capacity of 2,250 tons per 8-hour day. In the event of one unit becoming inoperative, double shift operation on one or more of the other units provides adequate backup.

The higher machinery content of this system is offset by the high backup capacity, and divisibility of the system.



8.3.4 Bale Transfer

The cost of bale transfer system for the Region (SWR or Laidlaw) is approximately \$2,000,000 per year higher than the cost of a direct or bulk transfer system. In our opinion, a bale transfer system is an acceptable method of solid waste management for the Region, with a number of unique advantages, however, the advantages are outweighed by the higher annual cost to the Region.

The advantages of the system are:

- High density, landfill, and hence reduced land use.

- Low rates of leachate and methane generation.

- Adaptability to resource recovery.

- Aesthetic aspects of landfill operation.

The disadvantages of the system are:

- Relatively high operating cost

- High capital cost

- Vulnerability to breakdown.

- Possible long term leachate and methane generation

The high density landfill produced by the bale system results in considerably reduced landfill heights, compared with shredded and conventional sanitary landfill systems. If a conventional or shredded system is adopted, it must be accepted that land at Glanbrook will be used up relatively quickly, nevertheless, for any system, the practical life of the site appears to be at least



20 years. As discussed in Section 8.1 and 8.2, there are advantages and disadvantages to low rates of leachate generation, and this matter cannot be resolved at this time. The aesthetic advantages of the system are self evident. The aesthetic advantages of the system are self evident. The system is adaptable to resource recovery in the same ways as the direct and bulk transfer systems and can be used as a residue disposal/backup system for a future Resource Recovery system and it has limited use in baling recovered waste products.

The higher operating and capital costs of baling vis a vis direct and bulk transfer have caused the baling bids to be higher than the Cope, Laidlaw and Tricil bids for bulk/direct transfer systems. The EWS system, however, appears to envisage a higher operating cost than the baling systems, and we can find no rational for this.

Since a high density baler has approximately the same thruput capability as a push-pit, the larger number of push-pits in the bulk systems provides them with higher backup capability. However, the SWR baling system has more than adequate backup capability due to the dual push-pit installation proposed at Dundas.



8.3.5 Shredded Transfer Resource Recovery System (Front End Plant)

The shredded transfer system proposed by Tricil is only competitive with other systems when most or all of its throughput can be sold at a rate of approximately \$5.00 per ton for R.D.F.

In our opinion, a shredded transfer system is an unacceptable method of solid waste management for the Region at this time. Its disadvantages are:

High capital cost

Lack of market for R.D.F.

Machinery intensity

Low throughput and vulnerability to failure

High operation cost

No proven experience

Elimination of Upper Ottawa Street transfer station.

The advantages of the system are:

Availability of Province of Ontario subsidy on part of the capital cost.

Early experience in resource recovery systems

Our analysis shows that if all the R.D.F. produced by the system can be sold for approximately \$5.00 per ton (the optimistic possibility suggested by Tricil), the economics of the system are quite attractive (the cost becomes comparable with bulk/loose transfer systems and landfill is almost eliminated. In our opinion, however, even if a market for the R.D.F. is found, the price will not be \$5.00 per ton, as it will be necessary to transport the material, and possibly carry out further (secondary shredding and air classification) processing. Our view is that the value of the product F.O.B. the Resource Recovery plant proposed by Tricil would, at this time be close to zero, and hence the \$1,560,000 claimed by Tricil as possible income to the Region may also be zero.



The system proposed by Tricil has a relatively low thruput. If any component (shredder, conveyor, push-pit, magnetic separator) malfunctions, the entire processing line would become inoperative. This combination of low thruput and vulnerability to malfunction makes the system, in our opinion, unacceptable as a primary processing system for the Region.

The high operation and capital costs are self evident disadvantages, particularly in times of economic restraint.

Experience is only now beginning to be obtained with full scale front end plants. In our opinion, in the next five years design and operational experience, together with R.D.F. market development will probably be advanced to the extent that front end plants will be viable and practical from both economic and operational viewpoints.

The elimination of the Upper Ottawa Street site in the Tricil front end system will result in significant additional costs to municipalities and commercial facilities that would otherwise use that facility.

The advantage of Provincial subsidy is relatively minor in the proposed system (it results in a reduction in the annual operation cost of about 5%). The Region already is obtaining significant experience in Resource Recovery Systems at SWARU, and in our opinion, should not invest in a further system at this time.

In summary, there are a number of disadvantages for the Region if it embarks on a further Resource Recovery system at this time. We are of the opinion that the Region should not adopt a front end system in connection with this contract.



8.3.6 Summary

Direct transfer and Bulk transfer systems are acceptable and economic possibilities for the solution of the Region's solid waste management problem. Bale transfer is also an acceptable method, and has certain advantages over direct and bulk transfer systems. However, these advantages are outweighed by the high cost of the bale transfer systems. Direct haul and shredded/resource recovery systems are not acceptable methods of solid waste management for the Region for the reasons stated previously.

The total annual costs to the Region of each system type are shown in Figure 14.



TOTAL ANNUAL COST TO THE REGION FOR EACH SYSTEM TYPE

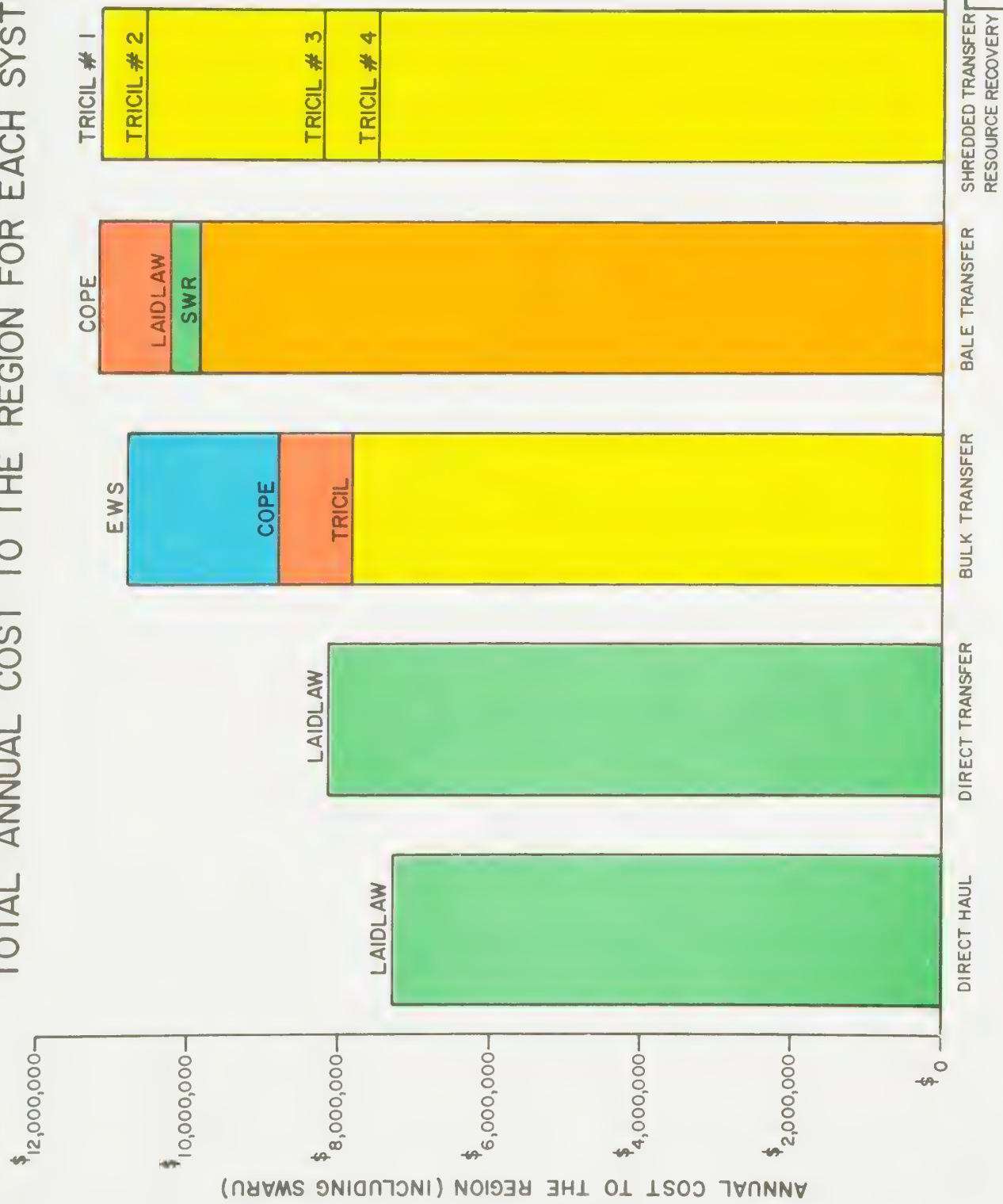


FIGURE 14

SECTION 9

APPRAISAL OF CONTRACTORS AND SYSTEMS



9. APPRAISAL OF CONTRACTORS AND SYSTEMS

In this section a brief review of each contractor and each system is carried out and these contractors and systems eligible for further consideration are identified. The Tricil Full Service Contract is identified as the recommended system for the Region.

9.1 A. Cope and Sons Bulk and Baled Systems

This firm has no previous experience in the field of solid waste management. However, the tender documents and questionnaire submitted, together with the interview presentation and discussions during the tour, demonstrated that their personnel have carried out a great deal of background work and have developed a good understanding of the problems of solid waste management systems.

This firm, however, was unique in not bidding firm prices for the capital components of the transfer systems proposed. This in itself is not sufficient grounds for disqualification, since such a procedure is in the nature of a unique addendum and this is permitted by the contract documents. The Cope bids, however, do not appear to be low for any of the tonnages, and cannot be defined as accurately as those of all the other contractors due to the uncertainty of the estimates contained in them. Since the Cope bids are not fixed, and they are not low, and since the firm does not have practical experience in the field of solid waste management, we recommend against awarding the Region's contract to this firm.



9.2 Environmental Waste Systems Inc.

This firm, a subsidiary of Browning Ferris Industries Inc. has substantial experience in solid waste systems throughout North America. There is little doubt that the firm could carry out the work provided for in the tender documents as effectively as any other. The tender submitted, however, is the highest for any materials handling system and is only exceeded by the Tricil Resource Recovery system. Since we recommend against the Tricil Resource Recovery system for various reasons, the EWS bid is the highest for any acceptable system. Clearly, the Region should only enter into negotiations with EWS if it becomes impossible to enter into a satisfactory contract with any of the lower bidders of acceptable systems.



9.3 Laidlaw Transportation Limited

Laidlaw is a substantial company with significant experience in Canadian low technology solid waste (collection) systems. We have recommended against the Direct Haul bid, and we also recommend that the Laidlaw Baling bid also not be considered any further.

During the interview and the visits to comparable sites, the representatives of the firm made no mention of the baling bid. The questionnaire answers received did not respond to the questions with respect to the baling system, and the firm has not demonstrated to us that it has either the expertise or experience to successfully operate a baling system. We believe that these are sufficient reasons to no longer consider the company for this system.

The direct transfer system proposed by Laidlaw is unique in all the bids received. It is a firm bid for a low technology system which meets the Region's needs. The bid is the second low of the transfer systems, and negotiations should proceed with Laidlaw if they fail with the low bidder for an acceptable system (Tricil).

The firm interprets the Region's Solid Waste problem as one of materials handling. While we agree with that interpretation we note that no emphasis was placed on the need for future resource recovery systems.

Although Laidlaw is not recommended for initial negotiations, in our opinion their direct transfer system is viable, and economic.



9.4 Solid Waste Reclamation Inc.

This firm is a subsidiary of a long established Hamilton scrap metal (resource recovery) firm. The only system submitted in its bid was bale transfer, and considerable emphasis was placed on resource recovery, which would presumably be achieved mainly by hand sorting and management of incoming loads, for product manufacture.

We have no doubt that the claims of system reliability and resource recovery capability cited in the firm's tender documents are well founded and would be achieved if this firm were to be awarded the Region's contract. The principals of the firm have a strong personal commitment to making the system work according to their claims.

There are several advantages to a baling system, and these are discussed elsewhere. Nevertheless, we are of the opinion that the premium that must be paid for the SWR system over and above the low bid for the low-bid bulk transfer system is such that we cannot recommend the SWR system.

If, however, Regional Council is of the opinion that a bale transfer system is worth an additional annual cost of approximately \$2,000,000 over and above a bulk transfer system, we recommend that negotiations proceed with SWR. This firm is more than capable of carrying out the work proposed, and the bid price the lowest of any baling system proposed.



9.5 Tricil Limited

This firm, owned by Canadian Industries Limited and Trimac Limited, specializes in the field of solid waste management. Although it has not been awarded any other contract as large as Hamilton-Wentworth, it has experience in various types of solid waste systems including a transfer station and experimental resource recovery facility in Kingston, Ontario. We are confident that the firm can adequately carry out the tendered work.

Tricil submitted two proposals -- a tender for a materials handling system and a proposal for a resource recovery system. For reasons explained elsewhere we recommend that the Resource Recovery proposal not be considered further.

A unique aspect of the Tricil bid is that a firm price is quoted for the operation of SWARU with a significantly increased tonnage throughput. This proposal is attractive to the Region for many reasons, and if the guaranteed throughput is achieved, SWARU will have fulfilled its intended purpose and the amounts of wastes to be landfilled will be reduced.

Since Tricil is the low bidder for an acceptable system, and is a competent firm, we recommend that negotiations proceed immediately with a view to executing a contract with the firm as soon as possible.

We recommend that Tricil be awarded the Region's contract for solid waste management for the following reasons:

- Lowest bid price for an acceptable system

- Firm bid for the operation of SWARU

- Lowest transfer operation cost, hence least sensitive to inflation



Transfer conveyor system suitable for
adaption to future resource recovery
systems

Tricil clearly has corporate commitment
to resource recovery

9.6 Summary

It is recommended that the Full Service Contract tendered by Tricil Limited be accepted and that negotiations be commenced with Tricil with a view to executing a contract as soon as possible. The basis for the negotiations is detailed in Section 11.

This recommended system will result in an increase in cost to the Region for solid waste management from the current cost of approximately \$4,150,000 per year to over \$8,000,000 per year. When the system is implemented, consideration should be given to increasing the charges to commercial users levied by the Region. These users generate approximately 80% by weight of the waste in the Region and will experience savings due to reduced hauls for the recommended system. The increased charges should at least reflect these savings, which can be readily identified. The recommended system will also reduce the collection system costs for some of the local municipalities, and it will reduce the amount of wastes to be landfilled due to the increased capacity at SWARU.



SECTION 10

FUTURE SYSTEMS AND RECOMMENDED CONTRACT TERM



10. FUTURE SYSTEMS AND RECOMMENDED CONTRACT TERM

When the Region's solid waste management system operation was tendered, it was hoped that a contractor would come forward with a system that would reduce or eliminate the need for landfill. Immediately upon receipt of the tenders it became clear that this had not happened. One of the reasons for the ten year contract term was related to the anticipated high risk capital investment required by the Contractor for such a system and the unwillingness of the Region to finance another innovative solid waste management system.

All of the systems proposed (with the exception of the Tricil Front End Plant) consist of components that have been demonstrated to be effective at the scale of the Hamilton-Wentworth system, and we have no hesitation now in recommending Regional ownership and financing of the facilities, since there will be savings to the Region due to the lower interest rate available to it compared with industry.

Since we do not recommend that the Region enter into the only proposed resource recovery system at this time, we must look to the future when resource recovery systems become viable.

The Tricil resource recovery concept appears to us to be a sound basis for such a system. It would appear to us that additional processing would be required (secondary shredding and classification).

Similar systems are in the shakedown or operation phase in the United States and at the Toronto experimental centre for Resource Recovery.

The Ontario Ministry of the Environment's Watts from Waste facility is still in the design stage.

We recommend that Hamilton-Wentworth proceed with such a system when the following conditions are met:



- 1). A market for the R.D.F. is established
- 2). The processing systems elsewhere have been proven
- 3). It can be shown to be an economically viable system.

We are of the opinion that the earliest date that all of the above conditions can be met is five years from now(1982). We therefore, recommend that the duration of the contract be revised to five years, and that towards the end of the contract period a decision be made whether to tender an add-on resource recovery system, or to tender operation of the bulk transfer system for a further period (not necessarily as long as five years). During the intervening period we recommend that the Region establish a liason with the Ontario Ministry of the Environment, with respect to the pursuance of potential markets for RDF.



SECTION 11

RECOMMENDED BASIS OF NEGOTIATIONS WITH TRICIL



11. RECOMMENDED BASIS OF NEGOTIATIONS WITH TRICIL

Although there are many details that need to be resolved in the negotiations, the following fundamental items should be identified as areas of Regional counterproposals and comments with respect to the original bid:

1. SWARU Liability Clause
2. Transfer Station capacities at Kenora and Upper Ottawa
3. Adaptability of transfer stations to future resource recovery systems
4. Capital cost of transfer stations and Regional ownership
5. Significance of proprietary equipment
6. Change of contract from ten to five years.
7. Conveyer Belt and Push-pit system definition.
8. Changes to transfer station sites.
9. Definition of Contractor's Responsibility for Site Services.

11.1.1 SWARU Liability Clause

Tricil proposes that its liability for operation of SWARU be limited to \$500,000. Presumably if the limit was reached, under these circumstances Tricil could cease operation of SWARU at very short notice. The need to limit the company's liability must be recognized. However, the Region must also be protected against sudden withdrawal by the contractor.



We recommend that the Region make a counter offer to Tricil as follows:

- 1). That there be no limit to Tricil's liability for operation of SWARU.
- 2). That Tricil may at its sole option cease operation of SWARU 365 days after giving written notice to the Region.

This arrangement would allow the Region to obtain staff and arrange for continuous operation of SWARU in the event of Tricil's withdrawal.

The method of calculation of the value of Tricil's SWARU operation must also be defined at this time, as it would be necessary to establish this value should the firm withdraw from the facility.

11.1.2 Transfer Station Capacities

The Tricil bid is for transfer stations of equal capacities at Kenora and Upper Ottawa. The studies previously carried out by the Region have suggested that a much greater amount of wastes would arrive at Kenora than at Upper Ottawa. The Kenora transfer station is also required as a backup system for SWARU. It would appear to us that a single push-pit installation at Upper Ottawa, and a triple system at Kenora is more logical than the two and two system proposed by Tricil.

Tricil should be requested to advise if rearrangement of the capacities of the transfer stations would have any effect on their bid, and also to explain their logic used in deriving the current configuration.



11.1.3 Adaptability of Transfer Station to
Future Resource Recovery Systems

Tricil should be requested to demonstrate how their proposed transfer stations can be adapted to future Resource Recovery Systems, and also to advise if such built-in adaptability affects their bid.

11.1.4 Capital Cost of Transfer Station and
Regional Ownership

Tricil should be requested to advise the Region in writing, the firm price and payment terms for the three transfer stations, and to advise if it has any objections to ownership by the Region.

11.1.5 Significance of Proprietary Equipment

Tricil should be requested to advise whether or not the proprietary aspects of the equipment have any bearing on the concept of Regional ownership of the system.

11.1.6 Change of Contract Term to Five Years

The Region should advise Tricil of its reasons for wishing to change the contract period to five years, with the right of renewal of the contract for a further five years, and request Tricil to advise if it has any objections, and if this has any affect on the tendered price.

11.1.7 Fixed Equipment Definition

Tricil should be required to provide the Region with technical details of all fixed equipment to be provided in the transfer stations prior to negotiations proceeding.



11.1.8 Changes to Transfer Station Sites

Tricil should be advised of the changes in the shapes of the Kenora and Upper Ottawa Street sites and the location of the Dundas sites, and be requested to advise whether or not these changes have any effect on the Tricil bid.

11.1.9 Definition of Contractor's Responsibility for Site Services

Tricil should be requested to advise in writing the services that are required to be constructed by others outside the Contract limits so that the proposed system can become operative.



11.2 Procedure for Negotiations

The following procedure for negotiations with Tricil is recommended:

- 1). A letter should be sent to the firm outlining the concerns detailed above, and a written response from Tricil should be requested, which could also raise additional items. These letters would then form the basis of negotiations.
- 2). During the negotiations stage, the matters raised together with others of mutual concern should be resolved, and Tricil should be requested to produce drawings of all facilities proposed.
- 3). A mutually acceptable draft agreement should be prepared, and then a recommendation submitted to the Engineering Services Committee for execution of the agreement with Tricil.



SECTION 12

DISPOSAL OF SNOW AND
NON-ACCEPTABLE WASTES



12. DISPOSAL OF SNOW AND NON-ACCEPTABLE WASTES

No firm bid was received for this work from any contractor. It is therefore, recommended that these problems be dealt with separately and be the subject of a separate report from the Commissioner of Engineering.



SECTION 13

SUMMARY OF RECOMMENDATIONS



13. SUMMARY OF RECOMMENDATIONS

- 1). That the Full Service Contract as set out in the proposal tender by Tricoll Limited, be accepted and that the Solid Waste Management System Steering Committee be authorized to negotiate a mutually acceptable agreement based on the said contract including the following matters:
 - a). SWMSU operation, management, improvements and limited liability, for a five year period with a right to renew by the Region for a further five years subject to terms to be negotiated;
 - b). Construction of the Kenora Avenue, Upper Ottawa Street and Dundas Transfer Stations for a fixed price to be paid by the Region;
 - c). The operation and management of the transfer system of stations for a five year period, with a right to renew by the Region for a further five years subject to terms to be negotiated;
 - d). The operation and management of the proposed Glanbrook site for a five year period with a right to renew by the Region for a further five years subject to terms to be negotiated, including all earth excavation. Buildings, fixtures, roads, fences and structures and leachate control system to be constructed by the Region;
 - e). That a draft agreement be prepared and recommended to Regional Engineering Services Committees, for execution by the Region and Tricoll.
- 2). That any acceptance of a proposal/tender or any Agreement negotiated pursuant to these recommendations be subject to the following conditions:
 - a). Approval of the solid waste management system and its components by the Ministry of the Environment, the Ontario Municipal Board and the Environmental Assessment Board.



- b). Successful acquisition of the Glanbrook Sanitary Landfill site by the Regional Municipality of Hamilton-Wentworth and approval of its use for sanitary landfill purposes by the Ministry of the Environment, the Ontario Municipal Board and the Environmental Assessment Board, including obtaining all legally required land use, financial and environmental approvals.
- 3). That disposal of snow and non-acceptable waste be dealt with separately and shall be the subject of a separate report to the Regional Engineering Services Committee by the Regional Commissioner of Engineering.
- 4). That the Region establish liason with the Ontario and Federal Ministries of the Environment so that the Region is aware at all times of the current status of the development of markets for Refuse Derived Fuel in the Hamilton-Wentworth area.
- 5). That Regional Council authorize the preparation of a report detailing the following with respect to the Glanbrook Landfill Site:
 - a). Further requirements for acquisition and approval of the site.
 - b). Design of the site facilities.
 - c). Budgetting requirements for the development of the site.
 - d). Preparation of an end use plan for the site.
- 6). That the Region evolve a statement for possible inclusion in the official plan concerning solid waste policies.



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